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Telephony.

THE AMERICAN TELEPHONE JOURNAL

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Insulation.

Probably there is no more important feature of toll line maintenance than the keeping up of insulation. The word, as used in the telephone industry, means protection from foreign currents and current escape to ground. If perfect insulation is maintained a direct path is provided for a current to pass from one point to another with a loss of only such e. m. f. as is necessary to overcome the resistance of the circuit over which it passes. This is, of course, a principle of long standing, but to maintain a plant up to the standard thus laid down, one must treat it quite as much from a practical as from a scientific standpoint.

Long lines and cables are more susceptible to transmission losses from this source than is any form of apparatus. The operation of the latter is so dependent for its proper action upon a specified amount of current that defective insulation usually results in actual trouble. The breaking down of a condenser, a slight cross between the windings of an induction coil, defective insulation between the winding and core or frame of a relay, are quickly noticeable, and are also generally beyond prevention by previous or periodical tests.

Lead armored cable is ordinarily not subject to defective insulation, outside of the cable boxes, except through some physical defect which will result in actual trouble at once. An opening in the armor admits moisture; unusual pressure on the sheath will result in crossing the conductors.

Still it is well to make some tests as opportunity offers. It is then in the open wire leads that the current finds bypaths and cross-roads which cause confusion in its journey. These are of such small magnitude that they cannot be classed as grounds. If a fog settles over a certain section the leakage is noticeable; if the line is in good condition, the service will not be interrupted, but transmission will vary to such an extent as in many cases to cause complaint. A case of this nature is of course unavoidable, but there are many other instances of leakage which, taken together with extraordinary weather conditions, aggravate such bad but unavoidable conditions.

In telephone practice, insulation is judged by the resistance per mile of line.

Atmospheric conditions will, to a great extent, affect the result of tests on a long line. It is therefore advisable to separate the line into convenient sections. This shows the portion of the line where the insulation is low. Tests should therefore, be made under most favorable weather

conditions in order to determine the avoidable causes for loss of energy.

Two of the chief causes are trees and broken insulators, and ties. In an article published in TELEPHONY April 3, 1909, Mr. H. P. Fairman outlined other causes, but classed them as possible causes for trouble and treated their elimination as preventative maintenance.

A few years as toll line wire chief will convert a man from a poet to a stoic. He will fail to appreciate the poetry in the line "Woodman, spare that tree." Tree trimming is one of his constant troubles, for, if the service is to be maintained at a high standard this problem must be ever under consideration.

Broken insulators and ties allow the wires to rest upon the arms, causing slight escapes.

Some one may ask to how low a point insulation may be allowed to drop with safety to the service? There is apparently a difference in opinion on this point, but for the guidance of a practical wire chief, a good rule to follow is that when the resistance of a wire drops below twenty megohms per mile, it is high time to give the matter attention, for, like an object falling by gravitation, insulation goes down with accelerated speed as it nears the bottom of the gage.

Look at the problem from another viewpoint. Suppose you are using current at 110 volts for testing insulation and your reading shows 10 volts escape. What per cent of your energy is wasted?

Of course the length of line is to be considered, as 10 volts escape on 50 miles of wire, would be a much more serious condition than on 300 miles, if the trouble proved to be distributed over the entire length of the latter.

It has been known in practice that under most favorable conditions a wire 350 miles in length tested absolutely perfect, using a Weston instrument graduated to one volt. The same wire under unfavorable weather conditions showed an escape of 90 volts. Had this wire shown 10 volts escape during favorable conditions, it would be almost useless. The paths to ground allowing 10 volts escape in dry weather would afford far less resistance in wet weather.

Lines passing through one or more cable boxes should be given special attention. A cable box affords opportunity for leakage which is beyond the observation of most inspectors.

An illustration of what no doubt is the existing condition in many cable boxes is shown by an experience of an official who, while watching a test board man working with a lineman at a terminal cable box, was seized with a desire to test the insulation of the conductors to that box. The test showed three volts escape out of 112. The cable was less than 2000 feet in length. Further tests indicated that the arrester mounting was defective. It was therefore replaced and brought to the office complete with its auxiliary equipment of fuses and carbons. There was absolutely no leakage between the arrester springs, binding posts and the ground bar. An examination of the fuses, which were a standard fiber tube pattern showed a leakage due to an accumulation of dust on the outside of the fiber cylinder. This accumulation of dust extended across the insulation of the mounting to the grounded portion of the arrester bar. The dust was an accumulation of years and was not easily removed.

Boxes thus located on streets where the traffic is sufficient to continually permeate the atmosphere with fine dust, are subject to this trouble. Alternate settlings of dust and moisture form a coating which blowing or wiping will not remove. But the frequent use of a hand bellows will accomplish much.

Carbon block arresters merit frequent attention. The carbons become "smoked," and while not heavily grounded are partially so, causing a waste of energy. The lowering of insulation due to accumulation of dust likewise applies to all apparatus, central office and otherwise. Relay racks and distributing frames should recive special attention.

Duty to Subordinates.

A chief clerk with whom we are acquainted found that a member of his force had made an error, which brought forth a serious complaint from a subscriber, put the company in the wrong, and was not to be explained away. The only thing open was to apologize. This chief clerk, being competent, reprimanded the one directly at fault, and then sat down and thought some—and then some. He reasoned something like this:

That clerk made a bad mistake and he ought to have known better. He hasn't done his duty toward the company, because he has failed to understand and know the records he keeps. But—have I done my duty toward that clerk? Have I carefully instructed him in his work? Have I properly supervised him, and have I been pleasantly accessible when he wanted to talk to me about his work? And then this chief clerk came to the conclusion that he, too, had failed, for he could not answer one of these questions wholly in the affirmative.

He then and there determined to do some missionary work among his force. To that end he studied his own records, and getting his force together, he lectured them upon the various accounts of the office, explaining their reason for existence, the routine of keeping them, their importance, and the necessity of accuracy, and finally questioned and examined each one of them as to his or her knowledge of what they had learned; and finally he came to know the extent of their understanding of their work. The result was better and more economical work in that office. That chief clerk felt that at last he had done his duty to his subordinates.

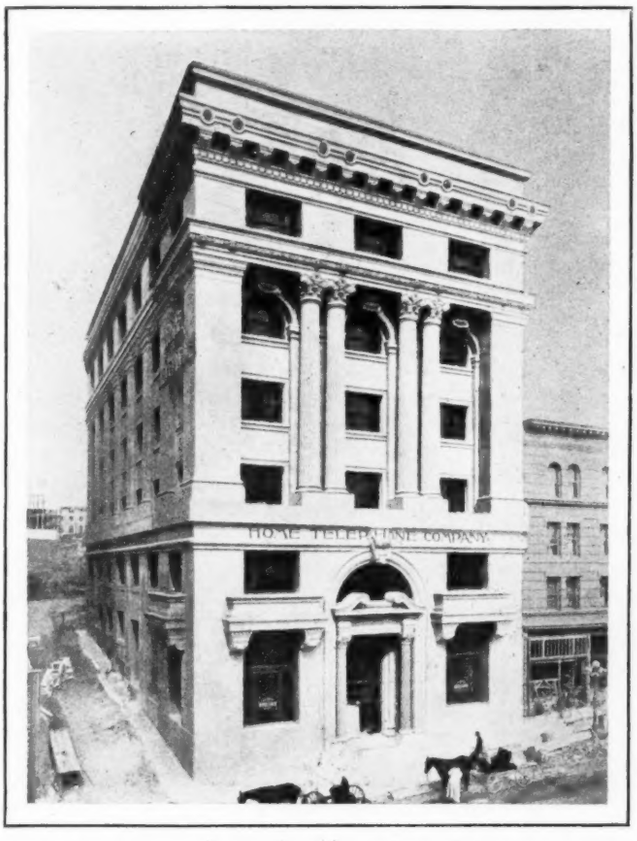
We read a great deal about the duties of the underdog to the upper-dog. To quote the famous sage of East Aurora, "If you are going to work for a man, for heaven's sake work for him," or deathless words to that effect. But, if you have human beings working for you, "for heaven's sake" what are you doing for them? Perhaps you think if you help them they will be ungrateful and not repay you. Probably they will, but what of it? You will have done your duty toward your subordinates. Many a young man who has been thought lazy simply did not know how to work. He would have directed his energies toward work and enjoyed it, had he known how to work. He did know how to do other things, and did them; so got a reputation for careless indifference. Are you doing your duty toward your subordinates?

San Francisco, an Independent Stronghold

If it ever could be said of a telephone system that it is a success before its cables become alive with electric current and the voices of the public, now is the time to say it. The system which warrants this strong endorsement is that of the Home Telephone Company of San Francisco, California, which has now reached a substantial approach toward completion.

California has seen the Independent telephone business of Los Angeles grow in the past seven years at an enormous rate, until this system has over 31,000 telephones, and Los Angeles is known throughout the world as a marvel of telephone development. San Francisco presents a field offering such a broad foundation that engineers and business men have considered it to be capable of sustaining a development on a scale parallel to that experienced in Los Angeles. Not only is there every prospect that the company will be able to do an abundant business in switching local calls, but the Independent development of California as a whole is so strong as to furnish a basis for a heavy toll business with San Francisco, as soon as the necessary terminals in that city are operative on the premises of the subscribers.

To students of the general progress of the Independent telephone movement the building of the system at San Francisco is of special interest, as it marks the termination of the struggle to maintain the idea that the telephone business is a natural monopoly, which was carried on so



The Grand Avenue Central Office Which Serves the Retail, Financial and Office District.

fiercely and bitterly in this place as to attract the attention of the whole country. In opening San Francisco to telephone competition, the Independent movement finds its competitor retaining exclusive service in but six of the largest cities of the country, and, with two exceptions, substantial progress toward the establishment of an Independent system has been made in each of these places during the past two years.

To the engineer, San Francisco stands as an example of

The West Central Office Which Will Furnish Service to the General Western Business and Residence Districts.

the possibilities afforded for the exercise of engineering ability on a broad scale, which by itself would indicate the high rank this branch of engineering must take in comparison with the skill required to plan and construct other great public works or industrial plants.

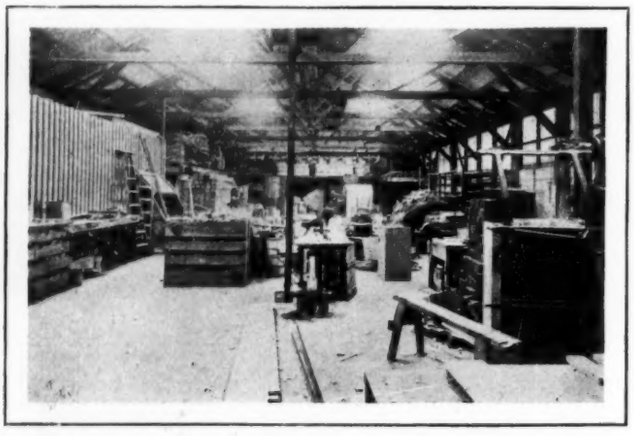
In San Francisco the construction work so far completed includes 413 miles of underground conduits and 850 manholes. These distribute wires throughout an underground area containing 160 miles of streets. This construction extends far beyond the legal requirements for underground work, under the City Ordinances, so much so that it will be many years before there can possibly be any necessity for its further extension.

It is only a matter of a few weeks before the company will be in a position to begin connecting subscribers' telephones to the various central exchanges; and it will be but a short time before a submarine cable will be laid across San Francisco Bay, connecting the Bay cities and towns with the San Francisco exchange.

In the building of this great system, as a broadly conceived and carefully constructed operating unit, the firm of McMeen and Miller has added to its well earned laurels the credit for accomplishing a piece of work which will deservedly attract the attention of the entire world. Mr. S. G. McMeen, during the past two years, has resided at San Francisco and given his personal attention to the work. The accompanying photographs give a bare indication of the magnitude and the strength of the project. Knowledge of the present status of the system may be best attained from the following quotation from the progress report which has just been prepared by the engineers:

"The general design of the automatic telephone exchange system of the Home Telephone Company of San Francisco is based on a study made during 1906, immediately following the earthquake and fire. This design has been developed further since the first general study, in order to adapt the construction to the conditions of the reconstructed city, as these conditions have disclosed themselves.

"The plan of the system in general is to accommodate the subscribers which can be secured during a long period after the first construction. There are certain portions of a telephone system which require it to be laid out of a size sufficient for the needs of a considerable future time, in order that the greatest economy of construction and operation may be secured. The general study for San Francisco determined the sizes and arrangement of these parts, and they have been built in that way. Examples of these parts which must be built of an ultimate size in the beginning are the underground system of conduits and manholes, and the central office buildings into which the subscribers' lines and trunk lines are carried. The underground system of conduits and manholes for San Francisco was designed and has been built of such a number of ducts or pipes, and of such a size, as to enable the conduit system to carry, without further general increase, all of the necessary lead sheathed underground telephone cables which will be required in the underground districts for a total estimated number of subscribers much greater than the immediate expectation. The telephone cables themselves are drawn into the conduit system thus provided as the growth in subscribers shall require.

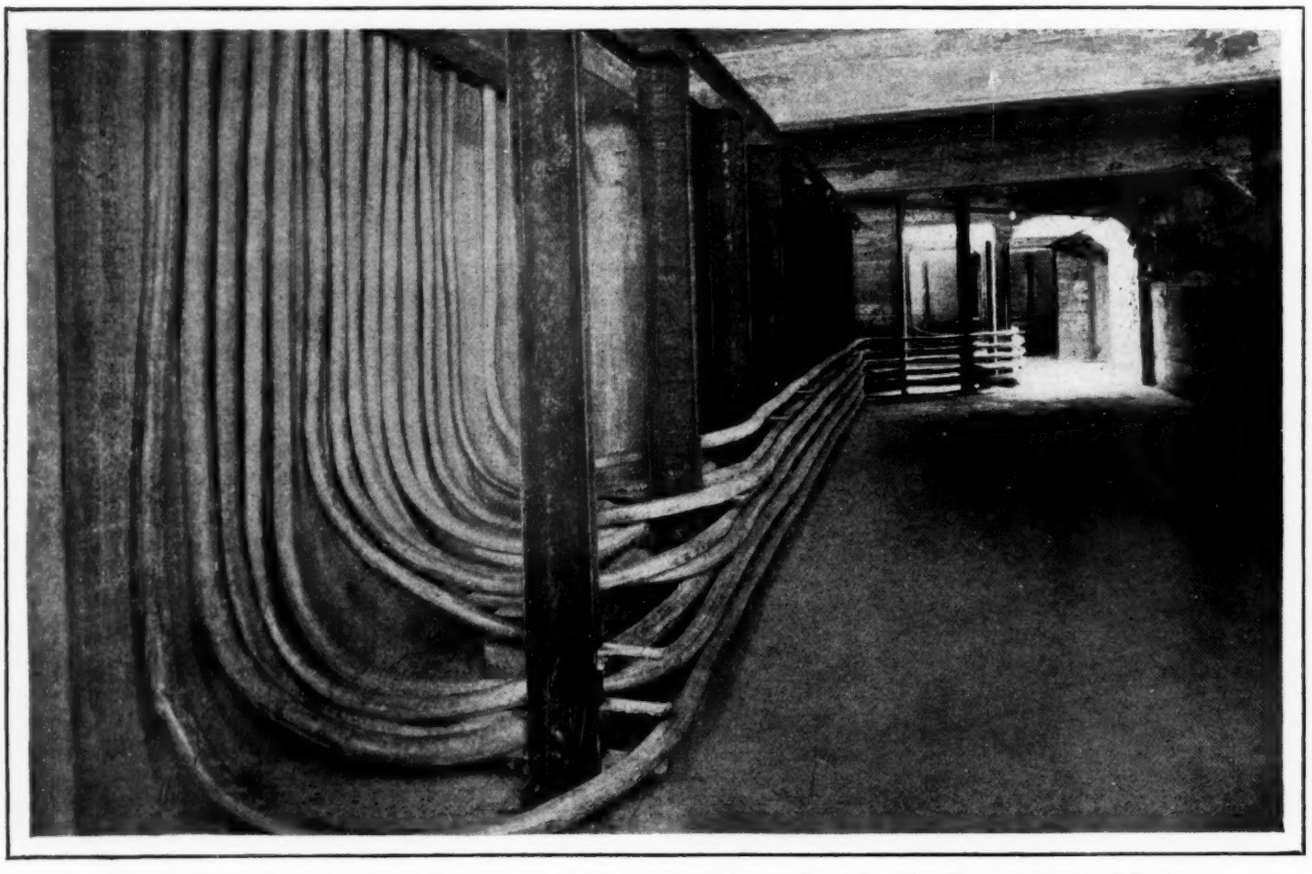


The Workshop of the San Francisco Home Telephone Company.

"The central office buildings of the system are designed so that each serves a definitely allotted portion of the city. Each such building is designed large enough to accommodate the apparatus and machinery required for the switching of all of the lines of its district at the end of the long period used as the basis of the plans. This terminal and switching apparatus, power machinery, storage battery and other switching equipment is in part installed of its ultimate size at the beginning; other parts, like the cables in the underground conduits, are arranged in advance for convenient addition in units as the growth in subscribers shall require.

"The switching equipment for San Francisco is of the automatic type.

"General Design.—The various central offices are interconnected by means of special trunk line cables, over which a connection between a subscriber in the district of one central office to a subscriber in the district of another central office is made by automatic means and by a process identical with the connection between two subscribers located very near together.



Arrangement of Cables Entering the Howard Street Central Office as They Pass Up Through the Wall Ducts.

"The scope of the plans is such as to enable 125,000 subscribers to be served without any change in the fundamental design, and by means merely of addition in equipment and lines, as the subscription for telephone service shall increase.

"It also takes into account the present and future requirements of telephone traffic between San Francisco and suburban points. A considerable volume of business is transacted daily between San Francisco and Oakland, Berkeley, Alameda, San Rafael, Sausalito and other towns and cities in neighboring counties about San Francisco Bay. A large part of the business population of San Francisco has residence in these suburban places, passing to and from San Francisco daily. For these reasons, there is a large and growing demand for telephone service between San Francisco and these suburban points.

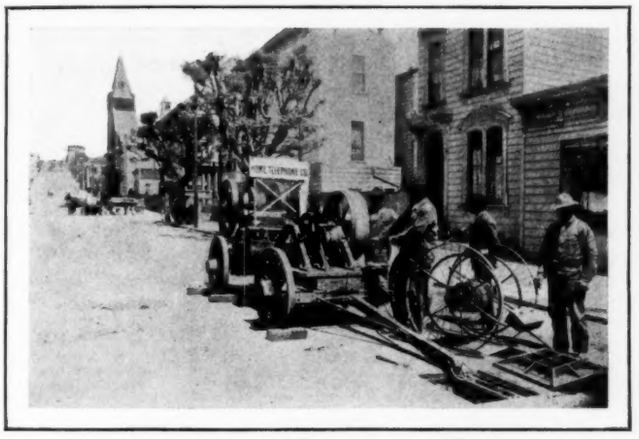
"The general design of the San Francisco telephone system contemplates reaching these suburban points over special trunk lines with the greatest economic speed and with a high grade of voice transmission.

"The trunk line connection between San Francisco and most of the suburban points is to be made through steel armored, lead encased, paper insulated submarine telephone cables.

"The general design of lines and apparatus contemplates the ability to connect long distance lines with the lines of San Francisco patrons, and to furnish, by these means, a high-grade long distance service between any San Francisco telephone of the Home Telephone Company and all other Independent telephones within range of the long distance system as it shall extend.

"*Progress.*—The plans call for the establishment, at the outset, of five main central offices, each serving a district of its own, and the establishment of additional offices and the subdivision of office districts at later times, as growth of the city and the system shall require. Four of the central office buildings first required have been constructed; all of them are enclosed and the installation of the power machinery, switching equipment and terminal apparatus is under way in all of them. The fifth immediate central office is under design, and construction upon it will begin at an early date.

"*General Offices.*—The general offices of the company are located in the principal telephone building in Grant avenue, near Sutter street. That building is of seven stories with a large basement, and provides room for present and future administration, for the automatic switching of all the lines of its district, and for the equipment necessary for both suburban and long distance traffic.



Drawing Underground Cables Into the Conduit. Reel of Cable Is Shown at Vault in the Distance.

Carefully Arranged Supplies in Warehouse of the San Francisco Home Telephone Company.

"The building is of steel frame construction, the exterior being of Colusa sandstone. It is classic in design and the architects have expressed in their work the thought

that the building is used but for a single purpose. This is made evident by the undivided treatment of the facade, a unity so seldom seen in buildings.

"The Corinthian colonnade comprises three of the upper

The Howard Central Office Serves the Downtown District South of Market Street.

stories in height and is the dominating feature of the facade. This is crowned by the classic entablature and cornice, which take in the top floor of the building. The Order is raised on a base three stories in height from the sidewalk line.

"The architectural scheme of the interior of the public office follows the exterior in simplicity and dignity. The ceiling is octagonally coiffured and is supported upon columns and pilasters of the Corinthian order.

"Buildings.—All the company's office buildings are of fireproof construction. They were designed by and erected under the supervision of Messrs. Coxhead and Coxhead, architects, of San Francisco, by whom the foregoing details descriptive of the Grant avenue building are furnished. Typical floor plan drawings are shown among the photographs subjoined to this report.

"A special building, complete and in use for a year or more past, provides warehouses and shop facilities with adjoining outdoor storage for heavy machinery and supplies.

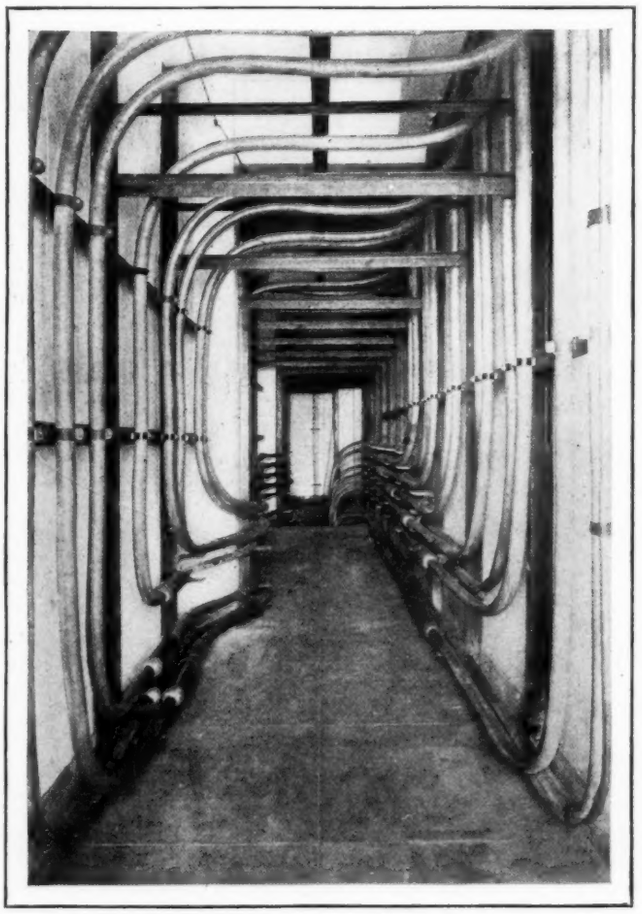
"Underground Conduit System.—In execution of the plan of designing the underground conduit system of an extent and capacity to make it unnecessary to do extensive conduit work in the immediate future, that portion of the plant has been built to cover a larger district than is required by the present local ordinances governing the distribution of electrical circuits. It is to be expected that the conduit system now completed will serve the needs of the Home Telephone Company and meet all legal requirements as well, for a considerable term of years.

"The conduit system is throughout of a type chosen as best adapted to meet the conditions of heavily congested streets in which much future digging will be done, to meet the particular underground earth conditions (sand, slope, sea water, etc.), and with a view to the presumption that earthquake shocks may recur. In the dense business center of the city, branches of the main cables in the underground system are carried through underground lateral pipes into the buildings. In the less densely built parts of the underground district, the services from the underground cables to the buildings either are entirely direct, as last mentioned, or distribution is made from distributing poles in back streets or on private property. These poles are reached by lateral cables from the main underground cables.

"Distributing Poles.—The entire system of distributing poles within the underground area is set and the most of them are joined to the underground system by the necessary lateral pipes.

"Cables.—The entire system of trunk cable sections interconnecting the several central offices has been drawn into the underground system. The trunk cable sections have been spliced, and are connected to their permanent terminal positions in two of the four central offices. Connections at the other two are ready to be made. The greater portion of the underground cables for subscribers' lines is in place and additional cables of this class are being drawn, spliced and terminated continuously.

"Building Connections.—Practically all buildings in the



Cables Passing From Top of Shaft to Main Distributing Frame on Floor Above.

downtown district now are connected with the underground cable system and are supplied with interior cabling and wiring, permitting telephone service to be given to any occupant.

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"Aerial System.—In the region lying outside of the underground conduit area, the telephone circuits are distributed by means of lead covered cables carried on poles. The circuits are distributed from these aerial cables to subscribers' premises by means of insulated wires. These methods eliminate the troubles due to the use of bare wires strung on insulators. There is no bare wire in the entire system.

"Central Office Equipment.—The automatic switching equipment installation is under way in each of the four central offices and is complete in the Grant avenue office. The equipment in each office consists of machines for producing and controlling the currents necessary for operation, a storage battery co-operating in this control, devices for terminating and distributing lines and apparatus for testing and record clerks, and for the distribution of information called for by the public. At least some part of each of these general classes of the entire equipment now is on hand and in place, or on hand and in process of installation. The installation is going forward as rapidly as the material is received.

"Service Meter System.—A further general element of equipment is an automatically operated service-meter system. The local ordinances of San Francisco, relative to telephone service, provide that such service rendered to business and professional patrons shall be paid for at rates relative to the amount of use in a given time. The purpose of the meter system, therefore, is to record the number of answered calls made by such a business or professional patron. The meter system is wholly automatic in its action, and a meter effects a count of one call only when a call has been made, and has been answered by a distant subscriber.

"The manufacture of the entire service meter system is completed. Its installation is going forward in the several central offices with that of the other parts of the mechanical and electrical equipment.

"Private Branch Exchange.—Provision is contained in the equipment for the operation of private branch exchanges, wherein a group of telephones give local service between different parts of a suite of offices or of a store or factory, and in which any of these local telephones may make calls to and be called by any of the telephones throughout the city.

"Submarine Telephone Cables.—Steel armored, lead sheathed and paper insulated trunk submarine cable to connect the San Francisco system with the Oakland system is under manufacture at this time. Its delivery, ready for splicing and laying in San Francisco Bay, will be made in the very near future. This submarine trunk cable will carry conversations between the San Francisco system and the now operating automatic system in Oakland. Ultimately this cable, with others like it, will furnish communication between San Francisco and the entire suburban region on the east side of San Francisco Bay.

"In the same manner, by means of submarine cables, Sausalito, San Rafael and the general suburban region of Marin County and counties farther north will be connected with San Francisco.

"Long Distance Connections.—Special machinery and apparatus for suburban and long distance service already are designed, of a type adapted to the special needs of the problem.

"The Restored City.—San Francisco has rebuilt since the fire in the most substantial manner. The intense business center recently has returned to the downtown district, having been housed on the western edge of the burned district for nearly three years following the earthquake and fire. In the adjustment of the housing of financial, retail, wholesale and professional activities, marked changes of location have been made. The general offices of the Home Telephone Company of San Francisco, in its Grant avenue building, are conveniently centered with respect to these downtown interests."

Figuring Insulation of Telephone Line.

In measuring toll lines the insulation resistance per mile is determined as follows: The line wire is opened at the distant end, and a reading with a voltmeter taken. A high voltage current is preferable—from 80 to 110 volts. When the leakage or escape is ascertained the following formula will give the resistance in megohms per mile:

Resistance of voltmeter, a; voltage used, b; deflection, or leakage, c.

$$\frac{a \times (b\text{-}1)}{c} = X, \text{ total desistance of line in ohms.}$$

Miles of wire $= d$

$d \times X = Z$, resistance per mile in ohms.

$Z \div 1{,}000{,}000 =$ megohms per mile.

(The resistance of the voltmeter multiplied by the voltage, minus the resistance of voltmeter, divided by the deflection or escape equals total resistance. Total resistance multiplied by mile of wire equals resistance per mile in ohms.)

It is generally understood that a megohm is one million ohms.

Drug Store Advertises Its Telephone Service.

Fred A. Snow, an enterprising druggist in Topeka, Kan., is placing in the newspapers extensive advertising of his telephone order service. The basis of the proposition is, as he states, that he will give to all telephone orders for drugs and druggists' sundries careful attention, and deliver purchases to any part of the city without any extra charge; whether the order is for an expensive prescription or a 5 cent box of cough drops.

In his most recent advertising, Mr. Snow states that during the past few months, since he began this advertising campaign, he has been favored with a large volume of telephone orders, which have brought many permanent customers.

Popularity of an Oklahoma Telephone Operator.

Several months ago one of the local papers of Sulphur, Oklahoma, started a voting contest to determine the most popular young lady in town. At the request of some of her friends, Miss Edna Lockhart, who is the night operator in the exchange of the Sulphur Telephone Company, entered the contest, which recently came to a close, a total of 969,500 votes being cast. Of this number Miss Lockhart received 672,000, thereby winning the prize, which was a piano valued at $400. This instance goes to show that Miss Lockhart's services in the telephone exchange are appreciated, as is evidenced by two-thirds of the total number of votes being cast in her favor.

Wireless Telegraph Stockholders Protest Against Management.

Reports from Philadelphia announce that about two hundred local holders of stock in the United and the American-De Forest Wireless Telephone companies have protested against methods employed by the present management of both concerns. A committee has been appointed to institute legal proceedings to compel an accounting, or, if necessary, to apply for receivership. The protesting stockholders assert that the officers are refusing to register transfers, thus making it impossible for holders to find buyers for their stock.

The Modern Telephone Cable*

By Frank B. Jewett

While the standard telephone cable of to-day is essentially an air-core cable, the amount of solid dielectric necessary for mechanical reasons is appreciable, and in specifying a wrapping of high-grade dry-rope paper ribbon the aim has been to utilize a material which will have the lowest possible dielectric capacity and dissipation, and at the same time possess the necessary mechanical properties to permit of its use in comparatively small quantities. That the paper should be spirally applied to the wires rather than put on in some other fashion, is the result of actual experience with other types of construction. In the early days of dry-rope paper insulation, numerous schemes for applying the paper were suggested and tried, with the result that spiral application was found to afford the greatest immunity from accidental crosses during installation while at the same time requiring a minimum amount of solid material in the core.

Insulation resistance.

Specification requirement: In every length of cable each conductor shall show an insulation resistance of not less than 500 megohms per mile of cable at 68 degrees Fahr., each conductor being measured against all the rest and the sheath.

For telephone cables made in the United States the foregoing requirement is the one ordinarily specified. In Europe the insulation requirements are frequently very much more severe than this, and sometimes necessitate drying the cable after it is laid and spliced.

It is extremely doubtful, however, whether a high insulation specification can be justified in view of the extra expense incident to meeting it and the exceedingly small improvement in transmission resulting therefrom. The result of American practice has indicated that the specification of an insulation resistance which will ensure honest manufacturing processes, a reasonable amount of drying and a permanent product, is all that is warranted. As a matter of fact, the regular drying processes adopted ordinarily give an insulation resistance materially above 500 megohms, although under the exceptionally humid conditions frequently prevailing in the summer months, the insulation at times approaches the specification figure.

An inspection of the foregoing attenuation formula and the constants for different dielectrics will show at once that high insulation is not in itself necessarily an indication that the cable will be efficient. Thus rubber-insulated cables which have an insulation resistance of thousands of megohms per mile are decidedly less efficient than dry-core cables of the same capacity whose insulation is 500 megohms per mile. Since the principal dielectric loss in a dry-core cable results from dielectric hysteresis, rather than from direct conduction, the specification of an insulation resistance requirement must, as previously stated, be looked upon primarily as one to insure an efficient process of manufacture and provide for a cable core which will not be subject to deterioration. The effect of this drying on the insulation and dielectric constant of the cable is shown in the following table of measurements made on a cable core before and after immersion in the regular drying tank. It will be seen that while the insulation has been improved materially by the removal of moisture the great improvement, so far as efficiency is concerned, has come from the reduction of the dielectric capacity and dielectric hysteresis in the cable.

Thus while the transmission efficiency has been increased 7.1 per cent by the process of drying, the improvement due directly to the increased insulation resistance is less than 0.001 per cent, that due to the reduced capacity being 7.0 per cent, and that to the reduced damping constant 0.1 per cent. As to whether further drying would not result in still further improvement, it can be said that beyond the period of drying ordinarily employed, the dielectric capacity and damping constant of paper show but little further reduction even with the most elaborate drying by chemical processes. Such processes, on account of their expense, could probably never be justified in any but exceptional cases.

EFFECT OF DRYING PAPER CABLE.
300 pair No. 19 B. & S. Gauge.

Insulation megohms per mile		Mutual capacity mf. per mile		Damping constant $8/2C$ (1,000 p.p.s.)	
Green core	Finished cable	Green core	Finished cable	Green core	Finished cable
300	1550	0.082	0.071	19	12

Dielectric strength.

Specification requirement: The insulation of each conductor shall be capable of withstanding a potential of 500 volts without rupture.

All dry-core paper-insulated cables used by the associated Bell telephone companies are required to withstand a direct-current potential of 500 volts between any wire and its mate, or between any wire and all of the remaining wires and the sheath of the cable. As noted previously, this requirement is incorporated not only to guard against the danger from failure due to the normal potentials met with in telephone operation, but chiefly that the cable circuits may be efficiently protected from lightning or when they come in contact with light or power circuits. Past experience has shown that efficient protection without unduly great maintenance charges can be obtained only by providing open space cut-outs which will operate at potentials lower than the break-down potential of the cable. As it is not feasible to maintain open space cut-outs with operating potentials much below 500 volts, this figure marks the minimum dielectric strength which admits of suitable protectors. For certain classes of cables, where the exposure conditions either to power circuits or to lightning are exceptionally severe, or where, as at submarine cables crossing in the center of long toll lines, the inability to quickly clear trouble or repair damage would involve serious interruptions of service, special high dielectric requirements are frequently specified.

Electrostatic capacity.

Specification requirements: In every length of cable the average mutual electrostatic capacity of all the pairs and the mutual electrostatic capacity of any pair, per mile of cable at a temperature of 60 degrees Fahr. shall not exceed the values given in the following table, the capacity shall be measured between one wire of a pair and its mate, the remainder of the conductors being connected to the sheath.

For cables used in exchange construction, such for instance as No. 19 gauge of 300 pairs or less, the mutual capacity referred to in the above quotation ordinarily averages slightly below 0.080 mf. Thus for a 300 pair No. 19 B. & S. gauge cable the specification average is 0.077 mf. and the maximum 0.084 mf. per mile for each length, while for cables of 240 pairs or less the figures are 0.070 mf. and 0.079 mf. respectively.

In the foregoing specification requirement the capacity is that measured by the ordinary charge or discharge method. While this constant is not that directly applicable to the computation of transmission efficiency for high frequencies, it is justified in manufacturing specifications on account of the difficulty of making accurate high-frequency determinations. It is also justified by the fact that in a thoroughly dried cable the capacity determined by the discharge method is not greatly in excess of the high-frequency capacity. This is indicated by the following

*A paper presented at the twenty-sixth annual convention of the American Institute of Electrical Engineers, Frontenac, N. Y., July 1, 1909. Concluded from issue of July 3.

table which gives the capacities of a small condenser having a cable paper dielectric 0.0085 in. thick, before and after the latter had been subjected to the ordinary drying process. It will be noted that in the undried state the difference between the discharge and high-frequency capacities is large. In a properly drawn specification the capacity requirement is a check on the insulation requirement as a guarantee of proper drying, it being impossible to provide the requisite number of pairs having the proper capacity in the specified sheath with an insufficiently dried core and still maintain the requisite dielectric strength.

Effect of Drying Cable Insulating Paper.

Condition of paper	Thickness of paper	Capacity of condenser micro-microfarads		
		Discharge	1,000 p.p.s.	2,000 p.p.s.
Undried	0.0085 in.	11,000	7,020	6,953
Dried	"	5,793	5,780	5,779

With dry-core paper construction by a proper cabling of the pairs, the capacity of the cables can be varied at will within a moderate range to meet different transmission conditions, while at the same time retaining the necessary mechanical and electrical properties. Owing to irregularities in manufacture and differences in location within the core, all the pairs do not have exactly the same capacity. For this reason, it is customary to specify both an average mutual capacity limit for all the pairs in each length and also the maximum mutual capacity limit of any single pair. This insures the proper efficiency for the completed cable run without putting such a stringent limitation on the uniformity of the product as to render the cost excessive.

It is now customary to specify mutual rather than grounded capacity, as the former is a constant of the cable directly indicative of its transmision efficiency. So far, however, as ensuring efficient construction and good workmanship are concerned, either mutual or grounded capacity would suffice, since within the range of capacities ordinarily met with in telephone cables the relation between the mutual capacity of a pair and the grounded capacity of its component wires is fairly constant, the mutual capacity being approximately 60 per cent of the grounded capacity.

If an attempt is made to secure too low a capacity by separating the wires and employing too small an amount of paper, the core becomes so soft that the completed cable is easily deformed, and consequently extremely hard to handle; on the other hand, any attempt to secure an extremely high capacity by putting an excessive number of pairs in the core renders the cable stiff and unwieldy, or if the amount of paper is sacrificed the dielectric strength will be unduly low. Experience has shown that an average mutual capacity of about 0.050 mf. per mile marks the lower limit for single-wrap paper cable which can be readily handled without undue deformation, while approximately 0.09 mf. per mile marks the upper limit. Between these two limits practically any desired capacity can be obtained, although on account of having to conform to a limited number of cabling schemes it is not always possible to secure a uniform gradation of capacity with a specified sheath diameter and number of pairs.

Sheath.

Specification requirement: The core shall be enclosed in a sheath composed of an alloy of lead and tin, the amount of tin by weight to be not less than 3 per cent. The sheath shall be free from holes or other defects and shall be of uniform composition and thickness. The thickness and outside diameter shall be for any size of cable as called for in the table given below.

For the mechanical protection of the core wires during and after installation and for preventing the ingress of moisture at all times, a continuous sheath composed of an alloy of lead and tin is molded firmly about the finished and dried core. This sheath, which varies in thickness from 1/12 in. to ⅛ in. for aerial and underground cables, depending upon the size of the core, is molded in a continuous section over each individual length of core immediately on the removal of the latter from the drying oven.

To ensure uniformity of practice in the cable plant it is necessary to set some limit on the maximum diameter of the sheath. At the present time the standard for a full size cable is 2⅝ in. outside diameter, this being the limiting size that can be satisfactorily drawn into a standard 3-in. duct. A cable of this size will contain 300 pairs of No. 19 B. & S. conductors having the capacity noted above.

No single problem connected with the development of the modern telephone cable has probably been so difficult of solution as deciding upon the proper type of sheath, and the brief specification clause quoted above embodies the results of years of experience. Unlike most of the other features of the cable, the proper requirements for the sheath could not be forecast to a large extent and many indeed have resulted from conditions developed since the use of cable was first begun.

At the time when impregnated-cotton-insulated cable was the standard construction, the sheath was formed up separately and the core drawn in. This necessitated a considerable amount of clearance between the sheath and the core and although the entire inner space was ultimately filled with paraffin or resin oil, the cable had a decided tendency to buckle and crack if bent on any except a long radius. For this reason and because it was frequently necessary to relocate cables in the plant, early specifications usually contained a clause stating that the completed cable must be capable of being wound and unwound a certain number of times on a drum of specified diameter without buckling or cracking. This requirement was to ensure the cable being serviceable when withdrawn from the duct.

The process also limited the length of sheath which could be continuous, so that where long lengths of large cable were needed to fit suitable manhole spacings, factory joints in the sheath had to be resorted to. The care in making these so as to withstand the rough treatment incident to pulling into the duct was such as to greatly increase the difficulties and expense of manufacture. As a result of the defects in the earlier forms the present process was developed of moulding the sheath directly on to the dried core so as to closely fit it, eliminating at once the necessity for factory joints and the need for clearance between the core and sheath.

The specification of a 3 per cent tin alloy for the sheath is likewise a result of experience gained in the early days of cable development. Added primarily for the purpose of hardening the sheath so as to better withstand rough usage during manufacture and installation, the amount of tin used was long a matter of individual preference. The present standard requirement was only arrived at when a careful investigation was made to determine the proper remedy for the cracking of aerial cable sheaths, which developed when the sheath was subjected to continued vibration. At the time there was a very strong sentiment in favor of a pure lead sheath for such cables, a sentiment based largely on the poor showing made by alloy sheaths in a number of instances and the feeling that a softer sheath would be less likely to crystallize. It was only when exhaustive laboratory experiments had shown the great superiority of a proper alloy over pure lead that the final solution was reached.

The following table gives some results of a series of experiments on the ability of different materials to withstand rupture when subjected to continued vibration under stress. In each case the test samples were strips 4 in. long, narrowed for 2 in. in the center to a section measuring ¼ in. by 3-64 in. One end was fastened to a metal tongue pressing lightly against a toothed wheel and the noted weight

suspended from the lower end. The tongue was given approximately 108 complete vibrations per second. Where two weights are noted the larger was added to hasten rupture.

VIBRATION STRAIN FOR CABLE SHEATH MATERIALS.

Material	Weight suspended	Time of stress
1. Lead Pure.....	13 lb. 2 oz.	55 m.
2. Lead Pure.....	6 lb.	10 hr. 15 min.
3. Lead 99.5%, tin 0.5%.....	13 lb. 2 oz.	32 hr.
4. Lead 99.0%, tin 1.0%.....*a*—	13 lb. 2 oz.	74 hr. with "*a*"
b—	23 lb. 2 oz.	and 1 hr. " "*b*"
5. Lead 97.0%, tin 3.0%.....*a*—	13 lb. 2 oz.	48 hr. with "*a*"
b—	23 lb. 2 oz.	and 9 hr. " "*b*"

With the advent of creosoted wooden conduit a great deal of trouble from the chemical corrosion of the sheaths was experienced. In these earlier ducts, wood creosote was the preservative agent employed but owing to the presence of considerable acetic acid, this had a ruinous action on sheath materials. Elaborate experiments at the time proved that while not wholly free from such corrosion, the 3 per cent tin alloy sheath was corroded much less than one of pure lead or with but a small proportion of tin. While improvements in the process of creosoting by the substitution of dead oil of coal tar for wood creosote thereby eliminating the acetic acid, and the advent of vitrified clay ducts, have practically eliminated chemical corrosion from the field of cable trouble, it was one of the factors which at the time led to the adoption of the present standard sheath material. Although an excess of tin renders the alloy too hard and brittle, only the minimum limit needs to be specified, the high price of tin automatically keeping the amount used as small as possible.

Cable specifications. In conclusion, a word might be said about the standard cable specifications to which reference has already been made. These specifications aim primarily to secure a certain standard for the finished product without unduly restricting the manufacturer as to the exact processes he shall employ to attain the desired end. While certain of the mechanical characteristics are incorporated, such as the use of a particular alloy for the sheath, and the employment of paper insulation to the exclusion of other materials, it is on account of experience having shown them to be the best available.

As a result of this aim, the specifications, though brief, have the clauses so drawn as to ensure the equivalent of a process known to be satisfactory. In the matter of brevity the present-day specification is analogous to the earliest specifications, which also aimed at a suitable finished product without specifying particular processes. There is this marked difference, however: much of the brevity of the earlier specifications resulted from an insufficient knowledge of the characteristics and possibilities of the materials and processes employed, while the brevity today is the result of a definite knowledge gained from long experience and a more comprehensive conception of the fundamental laws governing the efficient transmission of high-frequency currents, of just what each material will do under varying conditions and just what the limitations of any particular process are.

Between the specifications of the late '80s and those of today an era intervened in which it was frequently customary to specify minutely the exact process to be employed and the behavior of the finished cable under widely differing conditions, such, for instance, as the specification of just what the allowable capacity should be at a number of different temperatures. And however much future specification requirements may differ from those of today as regards subject matter, owing to advances in the art, the laws governing the propagation of currents along wires are sufficiently well known to make a recurrence of this type of specification unlikely.

Wood Preservatives Used In 1908.

More than 56,000,000 gallons of creosote and nearly 19,000,000 pounds of zinc chlorid were used in preserving timber in the United States last year. Small quantities of crude oil, corrosive sublimate, and other chemicals were also used.

These figures are based upon reports to the United States Forest Service of forty-four firms which operated sixty-four timber treating plans. Assuming that on an average one gallon of creosote, or one-third of a pound of zinc chlorid, will protect a cubic foot of timber from decay, more than 100,000,000 cubic feet of cross-ties, piling, poles, mine, and other timbers were given a treatment that will greatly increase their life and usefulness.

Never since timber treating began on a commercial scale in the United States has the domestic supply of creosote been equal to the needs of the industry. With the rapid development of wood preservation in recent years, the insufficiency of the home production of creosote has become more marked. In 1908 almost seven-tenths—to be exact, 69 per cent—of the creosote used by the treating plants was imported, and but 31 per cent was obtained from domestic sources.

Nearly three-fourths of the imported creosote comes from England and Germany, some is obtained in Nova Scotia, and some in Scotland and Holland. The domestic creosote used by the treating plants was obtained chiefly in New York, Philadelphia, and other large cities.

Creosote is distilled from coal-tar, a by-product in the manufacture of illuminating gas and coke from bituminous coal. Not more than 20 per cent of the coke used in the United States is made in by-product ovens. No coal-tar is recovered from the bee-hive ovens in which most of the coke is made; consequently the total production of coal-tar is far less than it would be with more conservative operations.

Were all the tar produced which the coal annually coked in the United States is capable of yielding, it would distill as much creosote as is not used by the wood preservers. Unfortunately, American operators do not even get the fullest use of the limited quantity of coal-tar made in this country for it does not pay the operators to distill coal-tar for creosote alone; so, unless they can find a market for the associated products, it is not separated. Germany has gone far ahead of the United States in the development of coal-tar products, and her exports of them to this country are steadily increasing.

The zinc chlorid used in wood preservation is all obtained from domestic sources according to the reports. Most of it is produced by a few large chemical companies.

Cross-ties are particularly liable to decay, since they are used under conditions which are favorable to the growth of the wood-destroying fungi. Consequently the railroads have always taken a leading part in timber preservation in the United States. Twelve of the forty-four firms which are operating timber-treating plants are railroad companies.

The majority of the treated ties used by the steam railroads was preserved with zinc chlorid, while with the electric roads more ties were treated with creosote than with any other one preservative.

Many telephone and telegraph poles are creosoted and there is a growing use of treated timber by the most progressive mine operators. In many harbors, the only practical method of protecting piles from the destructive teredo is to creosote them heavily. One of the most recent uses of creosoted wood on an extensive scale is for rectangular wooden block pavement. New York, Boston, Baltimore, Indianapolis, Chicago, and other large cities are using large quantities. Creosoted wooden blocks have been laid in front of the new terminal station in Washington.

History of the Automatic Telephone*

The Lorimer System—Continued

By Arthur Bessey Smith

Assistant Professor in Telephone Engineering, Purdue University.

Events at New York.—The work which was being done in the Decker building in New York attracted some attention, and the apparatus was viewed by numerous people who might be interested financially. On Jan. 12, 1895, the *Electrical World* published an account of the system, giving views of the apparatus and a popular description of its operation. Though it came nearer working than the machines made at Brantford (which were a total failure), the New York apparatus could not be termed a success. On one occasion it worked for about a dozen calls with success, and without the usual coaxing of the switches. This was considered phenomenal.

In the summer of 1895, Egbert Lorimer, the youngest of the brothers, who was still in Brantford, Ontario, was taken with typhoid fever. Since the death of the father, George was the natural head of the house and at once went home to take care of his brother. Soon the mother also came down with the dread disease. Faithfully he took care of both of them through that illness in which nursing is such an important factor, and finally had the pleasure of seeing them on the road to health. But early in September he received word that Hoyt, who was in New York, was sick with typhoid fever. So George hurried to New York to look after him. He was sent to the hospital, where for two long months he battled against death.

During the month of September Mr. Callender went to Europe. He had been contemplating the trip for some time. The salaries of the Lorimer brothers were small and little or no money was left them for expenses during Mr. Callender's absence. With the conditions of living as they are in New York, it is no wonder that before Mr. Callender's return they got into straightened circumstances.

Early in November Hoyt had recovered sufficiently to be discharged from the hospital. During his sickness the doctors had used the ice-pack treatment, then much in vogue. Neither boy had an overcoat, which Hoyt in his weakened state sorely needed. One day George saw an advertisement of a place away down town where an overcoat could be bought for $5.70. Counting up their store of money they found just $5.70 on hand. No money for car fare! So both boys walked a good number of miles to get the overcoat to protect the weaker from the chill November wind.

About the middle of November Mr. Callender returned from Europe, and as soon as money could be had Hoyt was sent home to Brantford to recuperate.

THE RETURN TO BRANTFORD.

During the past year considerable feeling of dissatisfaction had arisen on the part of the Brantford investors, whose money was still tied up in the invention. They wished him to come back to Brantford, form a stock company, and carry on his future operations there. This Mr. Callender did not wish to do, and sent George Lorimer, in the late fall of 1895, to treat with the Brantford men for different terms. But they were firm, demanding the return to Canada. So Mr. Lorimer returned to New York at once. About the middle of January, 1896, Mr. Callender returned to Brantford. George Lorimer was left in New York to clear up the rooms, sell what junk he could, ship the usable part of the goods, and come to Brantford later.

Shortly after this the Callender Telephone Exchange Company, was formed, according to the agreement. Mr. Callender was retained as consulting engineer, with George and Hoyt Lorimer as engineers. Mr. Callender spent much of his time developing a new scheme of his for rapid telephony, employing Egbert Lorimer to make some of the apparatus. The other two brothers continued working on the automatic system under Mr. Callender's directions, though there was a growing estrangement between the latter and the company. On one occasion there was a small difference of opinion between him and George over the safety of a grinding machine in the factory, after which he was not often seen there. About July or August, 1896, Mr. Callender severed his relations with the company. He was then engaged in working up a company to take hold of his rapid telegraph scheme. He soon went to England, where he organized the Callender Rapid Telephone Company.

After Mr. Callender left, Mr. Neill and others had conversations with the Lorimer brothers regarding the future work. The latter, while constructing the apparatus under orders, had been doing considerable thinking for themselves. They had seen the failure of the work, and thought they knew how to overcome it. After hearing their ideas explained, the company told the boys to go ahead and spend the money necessary to work out their ideas, as they believed them to be all right.

Some time this year (1896) a franchise was secured for an automatic telephone exchange at Troy, Ohio, and the construction of the switchboard was begun at Brantford. In October Hoyt was sent to Troy to superintend the building of the wire plant, in which he took great pride, making it a good, neat job. On account of Hoyt's poor health, George took most of the indoor machine work and the heavier tasks, to allow his brother the benefits of outdoor exercise as much as possible.

The new system which was to be installed at Troy was a direct successor to the second New York board described in the previous chapter. But in place of the bulky and cumbersome selector-connector, a number of discs were used. These discs were of rubber, and were mounted vertically in pairs on a horizontal shaft. One of each pair contained contacts for all the lines in the exchange and was stationary. The lines were multipled to all the stationary discs. The other disc of each pair was mounted to revolve on the shaft and carried the connecting brushes. Its connection to the shaft was frictional, and could be stopped by a magnetically released bolt, shooting into a series of teeth on its rim. Each line had an individual switch of different pattern from the New York style, but which changed the circuits from time to time in much the same way.

While the apparatus was nearing completion, George Lorimer noticed some inherent defects and the brothers had considerable correspondence over it. The system was completed, set up and tested out at Brantford in December, 1896, and January, 1897, and in February was shipped to Troy, Ohio. George came also at the same time to erect it in place. Now it is one thing to set up apparatus in a shop and make it work, but to secure satisfactory results in commercial use with the public to do the manipulating is a very different matter. Since it had developed weakness even in the factory, the system could not be expected to do better in practical use. And it was even so, for there were plenty of difficulties to test the ability of the young inventors. For one thing,

*Continued from issue of June 19, 1909.

the numerical separators did not act very well. To get around this, George tried various things, among which was a rubber tube containing mercury. A circular row of contacts was arranged just below the surface, so that if the tube were tipped a little, one or more of the contacts would be out of the mercury and the circuit broken. When the tube came to rest the circuit would close and perform the switching. But this did not solve the problem. The individual switches were also trouble breeders, and the disc circuit selectors were not far behind. At times the brushes of nearly all the selectors would get in line with each other. On the next call coming in, all these selectors would stop on the same line, thus tying up the system until that subscriber got through. It soon became rare for a call to go through the exchange without trouble, and the system was finaliy abandoned late in 1897.

BEGINNINGS OF THE LORIMER SYSTEM.

Shortly after arriving in Troy, George Lorimer consulted with his brother Hoyt as to means for overcoming the weaknesses of the system, and in March, 1897, partly devised the mechanism for doing it. They made sketches and talked it over with Mr. N. D. Neill, who was general manager of the company and their close friend. He was a practical man, keenly alive to the commercial needs and the difficulties which had been encountered. Seeing that the germ idea was good, he raised more money for development and told the boys to go ahead. In May they began work on an apparatus to try out certain principles involved which would demonstrate the correctness or fallacy of their ideas. The boys were boarding in Troy, where they were installing the exchange, but for better facilities a location in Piqua, Ohio, a few miles north, was chosen in which to do the experimenting. They went back and forth as occasion demanded. The apparatus was completed in the last part of August, 1897. It was very crude, not a complete exchange, but did the work.

(To be continued.)

Why the Directory is a Good Advertising Medium.

In the work of getting out the new directory by the Columbus Citizens Telephone Company, of Columbus, Ohio, the management sent out a circular on "Telephone Directory Advertising," which among other interesting statements, contained the following:

"An objection we sometimes hear is expressed about like this: 'When I look into a directory, it is for the number I want, and I pay no attention to anything else.'

"This assumes that the intent of this advertising is to get in your way at your busy moments. It may get in your way at some of the hundreds of times you give it opportunity—in some variation of mood or in some idleness attendant upon waiting for an answer or release of a busy line. We think we can meet this objection on its own ground by comparison. We don't propose to compare with the very costly things—a card in every car or a flashing sign, for example—but we do think that if any city directory advertising, if the ordinary billboard, if any interpolated, any next-to-reading matter, any get-in-your-way advertising of any kind is valuable, then ours is valuable. It is, we think, specially valuable because it offers no real interference and arouses no resentment.

"Eleven thousand directories used four times a day by one person, or once a day by four (and these are low estimates) for six months means over eight millions of references—say sixty-four thousand chances for stumbling on each advertisement, even if nothing is seen except on the page where a sought number is found. These are less than the real stumbling opportunities.

"Moreover, this takes no account of the reader's curiosity, his search for information, his attraction by form or matter, his interest in advertisements—or any of the motives that lead advertisers to try to reach him through small newspaper spaces, through circulars, or through magazines or trade papers.

"The bulk of all advertising is that which readers look at from choice; and when readers do choose to look it over, it is the best of advertising.

WHAT ARE THE ELEMENTS OF GOOD ADVERTISING?

"A suitable medium—ours is clean, dignified, and attractive in itself,—reaching a large number—ours is now a fixture in 5,200 homes and 3,200 business places,—of a desirable class—our subscribers are the local people who have the best purchasing power; attractive appearance,—this is for you to provide in your copy; interesting in form or matter,—again for you; repetition,—most of the users are constant users, and you get repetition by their repeated acts instead of your repeated expenditure; certainty,—this book contains the only advertising which is sure to be kept in the home and office; permanence,—it is one of a permanent series; affording ease of acquaintance if not of purchase,—your business is at the reader's finger's end; opportunity to reach new eyes,—few persons are long in Columbus without making a telephone call or looking for an address, not to mention the many books circulating in Franklin and adjoining counties; freedom from competition,—on any opening of our book but one advertisement is displayed; relatively low cost,—except on your own premises, where else can you get a good lasting display for a low price?

"You don't get from us exclusive display, as on a four-thousand-dollar magazine cover; news stories, as in the department stores' newspaper pages; sheets of description or illustration or prices, as in your circulars or catalogs; or personal contact, as through salesmen. But you do get a persistent leader to call attention to such of these things as you have. And your advertisement alongside the telephone (if you have a salesman at your end) is like a stamped envelope enclosed with your circular, or a display of attractive goods in your own show-windows.

"If magazine advertising is good for the general advertiser, then the Citizens' directory advertising is good for the local advertiser."

Virtues a Rural Subscriber Ascribed to Lightning Arrester.

Two women neighbors on a rural bridging telephone line, had the following conversation. Mrs. Phillips had been using her telephone for over a year; the batteries were nearly exhausted, and talking was weak.

Mrs. Wagner's telephone had been installed that day, and a new block and fuse lightning arrester went with it to keep out the Missouri lightning.

Mrs. Wagner rung up Mrs. Phillips, and, to her "hello," said:

"Hello, is that you Mrs. Phillips?"

"Yes; is that you Mrs. Wagner?"

"Yes. I thought I'd call you up and talk to you over our new 'phone. Can you hear me good?"

"Mrs. Wagner, you sound like you were talking right in my ear. Can you hear me good?"

"Not very good, Mrs. Phillips. You sound like you were over behind my folding bed."

"Mrs. Wagner, why can I hear you so good and you not hear me good?"

"I'll tell you why, Mrs. Phillips; when they put in our 'phone, they put in a new switchboard just above the telephone."

"Mrs. Wagner, I will have Willie see the telephone men and have them put in a new switchboard above our 'phone, then you can hear me as good as I can you."

Report of Kansas City Companies

The continued progress and sound financial position of the Kansas City Home and Long Distance companies makes them noteworthy examples of what Independent companies should be. This year's report is remarkably satisfactory, and is of such general interest that it is here reproduced in full. Following is the text:

To the Stockholders: June 1st, 1909.

Your directors take pleasure in submitting herewith the result of the operations of the Kansas City Home Telephone Company, and Kansas City Long Distance Telephone Company, for the fiscal year ending March 31st, 1909. The following statements of earnings for the past five years show the growth of the business:

THE KANSAS CITY HOME TELEPHONE COMPANY.

	March 31, 1905	March 31, 1906	March 31, 1907	March 31, 1908	March 31, 1909
Gross earnings	$406,016.54	$527,659.46	$658,897.42	$766,945.93	$819,786.72
Expenses	230,349.22	280,169.14	361,460.29	412,970.94	413,535.32
Net earn'gs.	$175,667.32	$247,490.32	$297,437.13	$353,974.99	$406,251.40
Interest	126,191.34	125,819.77	140,168.59	150,101,56	150,260.04
Surplus	$ 49,475.98	$121,670.55	$157,268.54	$203,873.43	$255,991.36

KANSAS CITY LONG DISTANCE TELEPHONE COMPANY.

	March 31, 1905	March 31, 1906	March 31, 1907	March 31, 1908	March 31, 1909
Gross earnings	$ 25,730.41	$ 67,849.49	$133,976.65	$188,266.55	$280,294.85
Expenses	9,745.30	21,443.54	54,250.41	79,340.06	176,673.77
Net earn'gs.	$ 15,985.11	$ 46,405.95	$ 79,726.24	$108,926.49	$103,621.08
Interest	18,935.00	30,000.00	46,110.54	53,882.93	54,277.05
Surplus	$ 2,949.89	$ 16,405.95	$ 33,615.70	$ 55,043.56	$ 49,344.03

A combined statement of the above for the last two years is as follows:

	1908	1909
Gross expenses	$955,212.48	$1,100,081.57
Expenses	492,311.00	590,209.09
Net earnings	$462,901.48	$ 509,872.48
Interest	203,984.49	204,537.09
Surplus	$258,916.99	$ 305,335.39

The surplus of the two companies having gained $46,418.40 over the preceding year, and the total being at the rate of 12.9-10 per cent on the outstanding stock of the Kansas City Home Telephone Company, an increase of 2 per cent over the year ending March 31st, 1908. Attention should be called to the fact that the very large increase in gross earnings of Kansas City Long Distance Telephone Company is due to the fact that commissions and mileage paid other companies are included and charged to expense, whereas formerly commissions and mileage were deducted before taking off gross earnings. Since its organization, dividends have been paid to stockholders of the Kansas City Home Telephone Company in the sum of $504,636.25.

After setting aside $150,000 as a depreciation reserve in the Kansas City Home Telephone Company, the payment of $34,040.79 to the trustee as a sinking fund for the ultimate redemption of the bonds of Kansas City Long Distance Telephone Company, and the payment of the above dividend the surplus account of both companies March 31st, 1909, amounted to the sum of $258,757.14.

The following comparative statement of the Kansas City Home Telephone Company shows the number of telephones in service, the average earnings, expenses, net earnings and surplus per telephone for the past five years:

	Mar. 31, 1905	Mar. 31, 1906	Mar. 31, 1907	Mar. 31, 1908	Mar. 31, 1909
Number of telephones	11,389	14,831	18,661	20,146	22,500
Average gross earnings per telephone	$42.05	$40.72	$38.54	$39.07	$38.66
Average expenses, tel.	23.86	21.62	21.14	21.04	19.50
Average net earnings	$18.19	$19.10	$17.40	$18.03	$19.16
Average interest per tel.	13.07	9.71	8.20	7.64	7.08
Average surplus	$ 5.12	$ 9.39	$ 9.20	$10.39	$12.08

Kansas City Long Distance Telephone Company has added to its property and increased its business during the last year. The accompanying statements set forth the increase:

	Mar. 31,1908	Mar. 31, 1909	Gain
Telephones	5,201	5,947	746
L. D. pole line (miles)	999	1,010.8	11.8
L. D. circuit (miles of wire)	3,908	4,303.4	395.4
L. D. messages	625,950	687,219	61,269

	TOLL LINE				EXCHANGE			
	Per Mile Pole Line		Per Circuit Mile of Wire		Per Toll Message		Per Telephone	
	1908	1909	1908	1909	1908	1909	1908	1909
Gross earnings	$181.50	$201.42	$46.40	$49.73	.289	.295	$14.75	$14.36
Expenses	101.68	130.40	26.00	32.19	.162	.191	8.31	8.08
Net earnings	$ 79.82	$ 71.02	$20.40	$17.54	.127	.104	$ 6.44	$ 6.28
Interest	39.34	39.90	10.05	9.85	.063	.058	3.51	2.91
Surplus	$ 40.48	$ 31.12	$10.35	$ 7.69	.064	.046	$ 2.93	$ 3.37

It will be noticed that the toll line expenses increased during the past year. This was due to a severe storm in February, 1909, requiring the outlay of much money for repairs, all of which was charged to maintenance.

The closest attention has been given to the quality of the telephone service furnished our subscribers. The following comparison from the traffic department of the Home company is of interest:

	March 31, 1908	March 31, 1909
Average time answering calls, seconds	3.53	3.48
Service complaints	4,383	4,548
Average number of week day calls	297,151	313,620
Total calls	97,959,843	103,121,994
Calls per line per day	14.9	14.9
Calls per telephone per day	11.7	11.5

The preservation and improvement of the physical property of the system has received careful attention from your board of directors during the past year, and in addition to the regular maintenance charges, the sum of $150,000 was put aside from our surplus account as a depreciation reserve, and a monthly charge of $5,000 will be made out of earnings hereafter for the same purpose. Insurance of all classes to the amount of over one million dollars is carried on the property of the system. The cash payments for the upkeep of the property during the past five years have been as follows:

	Home Company	Long Distance Company
March 31, 1905	$ 63,939.80	$ 2,089.55
March 31, 1906	93,035.42	6,532.52
March 31, 1907	119,003.72	17,229.53
March 31, 1908	140,459.19	22,737.28
March 31, 1909	131,678.10	41,274.58
Total	$548,206.23	$89,863.46
Total both companies		$638,069.69

Additions to the physical property have been made as follows:

	Home Company		Long Distance Company		Total	Total	Increase
	1908	1909	1908	1909	1908	1909	
Exchanges	7	7	5	6	12	13	1
Telephones	20146	22500	5201	5947	25347	28447	3100
Poles	21756	22938	46479	48328	68235	71266	3031
Cable (Miles)	213.7	259.1	15.7	15.77	229.4	274.87	45.47
Bare Wire (Miles)	5267	5874.3	8510	10906	13777	16780.3	3003.3
Total Wire Including Wire in Cables (Miles)	51152.8	63566.2	16005.2	18429.7	67158	81995.9	14837.9
Conduit Duct (Miles)	218.56	248.5	4.41	4.4	222.97	252.9	29.92
Manholes	435	481	13	13	448	494	46

The first mortgage bonds of the Kansas City Home Telephone Company are a first lien on the entire plant and equipment of the company, at present owned or hereafter acquired. The rapid growth of Kansas City requires the outlay of large sums of money each year to provide facilities for the installation of telephones; and, as the authorized

bond issue amounting to $3,000,000 is exhausted and the mortgage closed, the security of the bond holders is constantly improving. During the fiscal year ending March 31st, 1909, the sum of $151,549.03 was expended by the Kansas City Home Telephone Company for this purpose, all of which property is under the lien of the mortgage. It may be conservatively estimated that a sum equal to from five to ten per cent of the total bond issue must be spent each year to take care of new business.

The total expense incurred for construction during the past five years is as follows:

	Home Company	Long Distance Company
March 31, 1905	$597,413.71	
March 31, 1906	372,296.37	$309,776.80
March 31, 1907	336,637.48	245,800.55
March 31, 1908	134,030.56	21,788.31
March 31, 1909	151,549.03	85,010.93
Total	$1,591,927.15	$662,376.59
Total both companies		$2,254,303.74
Total expenditures year ending March 31, 1909		$ 236,559.96

Your directors acknowledge its indebtedness to the loyalty and efficiency of its employes, who are classified as follows:

THE KANSAS CITY HOME TELEPHONE COMPANY.

	Mar. 31, 1905	Mar. 31, 1906	Mar. 31, 1907	Mar. 31, 1908	Mar. 31, 1909
Construction and Maintenance	177	290	213	161	238
Operating	283	335	437	485	519
Officers and clerks	62	72	70	71	70
Total	522	697	720	717	827

KANSAS CITY LONG DISTANCE TELEPHONE COMPANY.

	Mar. 31, 1905	Mar. 31, 1906	Mar. 31, 1907	Mar. 31, 1908	Mar. 31, 1909
Construction and maintenance	19	56	98	34	69
Operating		9	54	75	76
Officers and clerks	5	5	17	23	30
Total	24	70	169	132	175

Total Home company	827
Total Long Distance company	175
Total employes	1,002

The most rigid specifications have been followed in making extensions and betterments during the past five years, and construction and expenditures for this purpose have been inspected and approved by Mr. Chas. H. Ledlie, consulting engineer of St. Louis, Mo., who has made repeated examinations of the companies' property, and whose reports are on file at the companies' office and may be examined at any time.

The accounts have been audited to March 31st, 1909, by Messrs. Price, Waterhouse and Company, chartered accountants, whose reports can also be seen by those interested.

A conservative prediction justifies the statement that the present year will prove even more favorable than the past year.

For the Directors.

Joseph J. Heim, President.

CONSOLIDATED BALANCE SHEET.

Assets.

Plant		$6,700,559.31
Buildings and real estate		183,143.62
Furniture and fixtures		14,079.37
Material, tools and supplies		54,152.53
Investments in and advances to affiliated companies		72,564.95
Accounts receivable, after providing for bad and doubtful accounts		56,228.40
Cash in banks and on hand		42,776.77
Deferred charges to income— Unexpired insurance, etc.		15,280.50
Investments of the Sinking Fund of Kansas City Long Distance Telephone Co.		
Cost of $18,400.00 bonds of the Kansas City Home Telephone Company	$16,318.75	
Cost of 19,000.00 bonds of Kansas City Long Distance Telephone Company	15,720.00	
Cash in hands of trustees uninvested	2,002.04	34,040.79
		$7,172,826.24

Liabilities.

Capital Stock— The Kansas City Home Telephone Company, authorized	$3,000,000.00	
Issued		$2,357,500.00
Bonded Indebtedness— The Kansas City Home Telephone Company, first mortgage 5 per cent gold bonds, authorized	2,978,700.00	
Less—In treasury	130,700.00	2,848,000.00
Kansas City Long Distance Telephone Company, first mortgage 5 per cent gold bonds, authorized and issued	1,113,000.00	
Less—Purchased by the Kansas City Home Telephone Co.	72,500.00	1,040,500.00
Bills payable		315,592.76
Accounts payable		68,733.41
Accrued interest on bonds and bills payable, accrued taxes, etc.		55,432.26
Dividend, payable April 15, 1909		35,362.50
Deferred Credits to Income, Unearned Rentals		8,907.38
Bond Sinking Fund of Kansas City Long Distance Telephone Co.—		
Appropriations to date	31,857.50	
Interest on investments	2,183,29	34,040.79
Depreciation reserve		150,000.00
Surplus—		
Balance at March 31, 1908	257,356.73	
Profit for the year ending March 31, 1909 $305,335.39		
Deduct—Transferred to depreciation reserve $150,000.00		
Appropriations to bond sinking fund 12,484.98	162,484.98	142.850.41
	$400,207.14	
Less—Dividends for the year.	141,450.00	258,757.14
		$7,172,826.24

Letters on Practical Subjects

Poor Ring-off on Connection to Series Telephone.

If there is anything in the operation of an ordinary magneto exchange that causes the switchboard man more trouble than the failure of the ring-off signals to operate when a connection is made to an 80-ohm series telephone, I have failed to find it. In our exchange we have had more real vexatious trouble from that than from any other trouble, and almost as much as from all other troubles put together. It is of such a nature that one cannot give the angry subscriber a satisfactory explanation, as one can when the trouble is a broken wire, a crossed line or a burned-out fuse. To a certain extent he can understand those things, but when he attempts to get "Central" after having a connection to a series telephone, and he can get nothing but the same party back again, he is justly angry. Operators do not supervise connections at all times, and the result is "trouble and dissatisfaction."

Some magneto switchboards are now put out that are not subject to this trouble, but at least 90 per cent of operating companies have the old style cord circuits in their switchboard. By placing a condenser in the cord circuit one may avoid the difficulty caused by the series telephone. Some switchboards are so arranged that it is quite a task and considerable expense to do this—and our board is one of that kind. The ideal way of curing this defect is to install nothing but high wound ringers, of not less than 500 ohms resistance. Unfortunately, we have too many series instruments to contemplate such a change.

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The way we are remedying the trouble is to cut out the shunt of each telephone, leaving the generator and ringer in series at all times. As each generator has a resistance of about 300 ohms, this raises the instrument resistance to the neighborhood of 380 ohms, which is sufficient to cause the 500 ohm ring-off drops to operate under ordinary conditions. It is usually a very simple matter to do this work, depending, of course, on the style of generator. A troubleman of ordinary ingenuity should be able to do this with nothing more than a screw driver, pair of pliers and occasionally a sharp-edged hook made from a piece of No. 12 iron wire. This hook will be required in working with a few old style telephones, in which the generator shunt is formed of a metal cup filled with wire clippings and sealed up with a mica disk. By holding the sharp hook on the mica disk and rotating the armature, the disk is quickly cut up so the wire clippings are spilled out, after which they may be brushed out of the generator box, and the job is complete. On other types all that is necessary is to spread the shunt springs so they do not make contact. From five to ten minutes per telephone is all the time that is required.

We have been using this plan for almost a year, and have had absolutely no bad results from it. Our system is operated complete metallic, with no grounds on any telephones except four party selective, to which this scheme is not applied.

One indirect result of the plan is to reduce the load on the ringing machines to a minimum, which is a decided advantage.

Clay Center, Kans. M. C. Wilson.

Editor's Note.—Our subscriber ought to know what he is talking about—but it sounds as if there might be some good objections to this plan. Who else has tried it?

A "T" Splice in Multiple Cable.

An interesting as well as unusual multiple is shown in the accompanying photographs of a "T" splice made between the "A" and "B" boards in a common battery exchange.

Fig. 1 is a front view, with the enclosing doors removed, the "A" board being situated at the left and the "B" board at the right.

Fig. 2 is a rear view taken at a point almost opposite that from which Fig. 1 was taken.

The "A" board cables leave the board eight wide and twenty-five high, while the "B" board cables leave the board six wide and thirty high, with an extra twenty, four wide

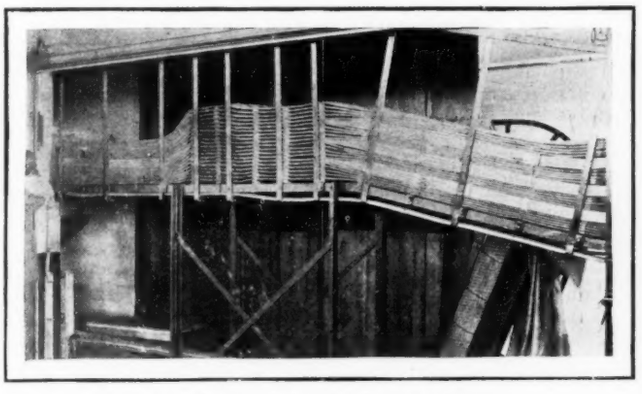

Fig. 1—Front View of "T" Splice.

and five high, on top: these meet the frame cables, which are twelve wide and fifteen high, with an extra twenty, four wide and five high on top.

Both views show very clearly how the racks from the terminal room ,two floors below, convey the frame cables to the splice; also the "built up" appearance caused by the thickness of the cables at this point.

The "dummy" cable blocks shown are used to fill in the vacancies necessitated by the formation of the three distinct runs of cable constituting the splice.

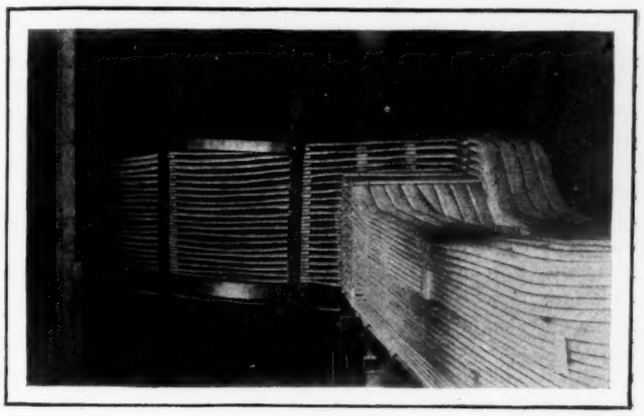

Fig. 2—Rear View of "T" Splice.

The board in which this splice was made has an ultimate capacity of 9,600 lines with 4,000 equipped; although the cables were "pressed" considerably before being put in place, very little trouble has resulted therefrom during the time since its installation, over a year ago.

A Progressive Company in West Virginia.

The Wellsburg Home Telephone Company, of Wellsburg, W. Va., has been making rapid strides lately. It has about 175 more subscribers than it had six months ago, now having over 425 subscribers, including the exchange at Independence, Pa., which was recently purchased from the McDonald Pa., capitalists. The Bell company has only about 50 in the city, where the Home has 325.

The company has spent a large sum in putting up about a mile and a half of cable, the largest of which is 150 pair, in making all lines in the city complete metallic circuits, and in fact, rebuilding the entire plant. This work is not yet finished in the down-town section. On account of the improved service the company is having a great demand for telephones.

The Independence lines are also being rebuilt, and about 20 miles of new country lines are being erected to satisfy the demand for the Home connections in Brooke county and elsewhere.

The new line to Avella, Pa., has been completed and connection with Bethany was established recently, and the Beech Bottom line was completed a few months ago. Also half a dozen other new lines are being built.

The directory to be published in a few weeks will contain names at Avella, Independence, Patterson's Mill, West Middletown, Bethany and Wellsburg, and will be the most complete business directory published in Brooke county and Independence township, Washington county, Pa.

The company is a strong home enterprise, with home officers and nearly fifty people in Brooke county interested, whose aggregate wealth surpasses half a million.

Chicago City Council Adopts Committee Recommendation on Extension of Tunnel Company Franchise.

Last week the City Council of Chicago voted in accordance with the recommendation of the Committee on Gas, Oil and Electric Light, with regard to the matter of the extension of the franchise of the Illinois Tunnel Company. The substance of the committee's recommendation has already appeared in TELEPHONY.

The Telephone in the Courts

By A. H. McMillan

Failure to Notify Party of Sick Call.

In an action against a telephone company for failure to notify Jeff Owens, at Caddo Mills, Texas, of a sick call, whereby he was prevented from reaching his mother's bedside before her death, it appeared that his brother, who put in the call, was advised by the company's agent at Seymour that he had met the agent at Caddo Mills and was told by the latter that Owens was gone and that he did not know his whereabouts. It was held that the brother was authorized to rely on the correctness of this information, and to conclude that further effort to communicate with Owens was useless. The telephone company claimed to have no agent at Seymour authorized to receive business for it. It appeared from the evidence, however, that under a contract between the company and another company maintaining an office at Seymour, the defendant company would accept a call and then connect the lines of the two companies, receiving a proportional part of the tolls. The defendant company was held liable for the acts of the agent at Seymour, although the contract showed on its face that the company had no agent at Seymour when the call was sent. Southwestern Telegraph and Telephone Company vs. Owens, 116 S. W., 89.

Telephone Pole a Nuisance to a Saloon.

A saloon keeper brought suit against a telephone company for damages alleged to be due him because the company set a telephone pole in close proximity and directly in front of the main entrance of his saloon. He obtained judgment, and the telephone company appealed the case to the Appellate Court of Indiana.

The lower court in its decision affirmed the judgment. It held, however, that the location and maintenance of the pole did not constitute a permanent injury to the premises. The verdict was reduced from $240 to $140. Loss of business and depreciation of the rental value of his property was held to be an injury peculiar to himself for which he was entitled to damages.

Passing upon the defenses made by the company, the court held that the setting of the pole was not an appropriation of property so as to require an abutting owner to resort to assessment of damages provided by Burns' Ann. St., 1901, Sec. 893. The rights of the public in the telephone system were held not to affect the owner's right to damages. The company contended that he had acquiesced in the location of the pole because it had stood there before he built his saloon, but the court held that this was not so, because the pole did not become a nuisance to him until his building had been erected. Merchant Mutual Telephone Company vs. Hirshman, 87 N. E., 238.

Duty of Telephone Company in Long Distance Calls.

A long distance call was put in to a telephone company for a father to call him to his sick child, and the telephone company was informed that he was working at a certain railroad roundhouse in the city to which the call was directed. It was held that such statement was a mere direction as to the place where the father would likely be found, and did not relieve the telephone company from making any further diligent search for him on being informed that he was not at the place designated. After the company had failed to find him at the roundhouse, another address was given and the telephone company charged the sender fifteen cents to send to such trustee. For this reason also, it was held that the company did not rely on the original direction. A judgment against the company for damages was given the father after suit, which was twice taken to the Supreme Court of Texas. Southwestern Telegraph & Telephone Company vs. McCoy, 114 S. W., 287; 119 S. W., 88.

Construction of Guy Wires.

A telephone company may construct and maintain such guy wires as are reasonably necessary to support its poles, providing it exercises ordinary care for the safety of pedestrians, and the company guilty of negligence in construction and maintaining a guy wire, is liable to pedestrians who stumble over it. Such was the opinion of the Supreme Court of Texas in a case where a lady in stepping from the sidewalk to the paved street, caught her foot in a guy wire of a telephone company, anchored in the edge of the sidewalk next to the street. In the trial of the case, there was evidence that the guy wires were frequently incased in boxes to make them more conspicuous, and that there was no box around this wire. It was held that instruction to the jury authorizing a recovery if they found negligence in constructing and maintaining the wire, and thus obscuring it from vision, was not erroneous, for the jury might find that the omission of the wooden box was incomplete construction.

A judgment for $7,500 was held to be excessive, and the woman was required to remit $1,500 of it. The injury she sustained was a Pott's fracture of her left ankle. City of Fort Worth vs. Williams, 119 S. W., 137.

Another "Sick Call" Case.

The legal profession in the South seem to be cultivating cases against telephone and telegraph companies for failure to answer sick calls. Several cases have already been noted in the columns of TELEPHONY. Another case of this kind is that of Cumberland Telephone and Telegraph Company vs. Jackson. In this case Jackson sued the company for failure to answer a telephone call to enable him to procure a physician for his sick wife. The court in charging the jury told them that they might allow such damages as would compensate the plaintiff for any inconvenience, anxiety and worry caused by the company's negligence. The court held that even if the use of the word "anxiety" was erroneous, it was evident from the size of the verdict, which was for only $100, that neither pecuniary damages nor damages for mental anguish were allowed for and that the instruction was not prejudicial. Central Telephone and Telegraph Company vs. Jackson, 48 Southern, 614.

Relief of Minority Stockholders.

Two minority stockholders of the People's Telephone Company of Hot Springs, South Dakota, brought suit against the corporation, its president, secretary and board of directors, asking for an accounting of the conduct of the business, and the appointment of a receiver to take charge of it. The president and general manager was the defendant, C. L. Jensen, of whom the plaintiffs bought their stock. They set forth that they bought their stock upon his promise and agreement that the entire cost of the operating expenses would be $50 per month, which would also include his own compensation as manager, rent, fuel and lights from December 1, 1895, to June 12, 1897. Jensen received from the company $6 per month for compensation. On the latter date, at a special meeting of the board of directors, attended by Jensen, his wife, and one Parks, who

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was under Jensen's control, the salary was raised to $75 per month. No separate bank account was ever kept, but Jensen placed all funds received for the company in his own private till. The books were kept by his wife, but never closed nor balanced. The lower court entered a judgment partly in favor of both parties, from which the stockholders appealed. The Supreme Court of the state reversed this judgment and granted the relief asked by the stockholders. Among other decisions, they held that a director could not with propriety vote in the board of directors upon a matter affecting his own private interest any more than a judge could sit at his own case, and that any resolution passed at a meeting of the directors at which a director, having a principal interest in the matter, voted, would be voidable at the instance of the corporation or shareholders without regard to its fairness, provided the vote of such director was necessary to the result. Therefore the vote of the directors by which the salary of Jensen was raised to $75 per month was held to be void. The court decreed $2,305.33 to be due the corporation and allowed the appointment of a receiver. Ritchie vs. People's Telephone Company, 119 N. W., 990.

Practical Questions and Answers

Condensers with Bridged Bells.

Would it benefit a copper metallic line, having four stations, 100 miles long, No. 10 wire, to have cut in series with each ringer a condenser of 2 M. F. capacity? The bells are all 1,000 ohms.

The insertion of a 2 M. F. condenser in series with a 1,000 ohm bell tends to reduce its impedance, so that when you ring on the line more current will go through the bell, the ringing voltage being equal. If your bells are equally spaced, or nearly so, there is a likelihood of the condensers doing more harm than good. Each of the intermediate bells will take more current and lower the voltage which finally exists across the last bell. If you have trouble ringing one way, but not the other way, it will help matters to put a condenser on the bell at the far end.

Noise on Party Line Having Non-Interfering Telephones.

We use bridged metallic telephones, 1,600 ohm ringers, and ring "Central" with a grounding key. The enclosed diagram will show the position of the lines on the pole. 7, 11 and 3 are noisy. After the toll line and 7 leave this pole line they each run into different towns, in different directions, that have electric lights. These lines are quiet when they are on a toll line drop, when central has plugged in, and when central is switched off. Is there anything that could be put on the ground that we could ring through, but would not let the induction through? We do not want to give up our "push button" telephones, but we will have to if we cannot get rid of the noise.

Fig. 1-*A* shows the arrangement of lines on the pole. The two lines, toll and 7, are bringing the noise from the electric lights in the distant towns, and as usual it affects the other circuits as well. If you will change the line circuit to be like Fig. 1-*B*, it will stop the noise. Get the makers of your board to supply you with 4-point jacks for these lines, so that when the operator plugs in the drop and the retardation coil will be completely cut off. While

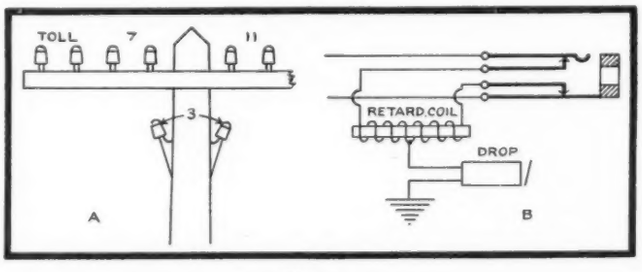


Fig. 1.

the people on the line are talking among themselves, the two halves of the retardation coil will balance the line and make it quiet.

Running a Straight Line.

In staking off a telephone line, what is the best method to get a straight line without the aid of a surveyor's instrument? Describe fully.

Let *A X*, Fig. 2, represent the line on which it is desired to set poles. Set up a stick or flag at *A* and another at *X*. For accuracy, *A* and *X* should be as far apart as it is possible to have them. Two men are necessary. One goes to the approximate location of the next pole, *B*, and the other to *C*. Facing each other each man looks over the head of the other to see the flag beyond. By motioning each other to move sidewise, they can line themselves so that each can see the other man directly in line with the flag. In this condition, the two men and the two flags will be as nearly in line as it is possible for them to get without the

Fig. 2.

transit. Then each drives his stake, and both proceed to the next two locations and repeat the performance. Practice is necessary to get good results, since there is much room for error owing to the width of a man's head over which the sighting is done. If each man carries a pole, the work is made more close. Making a very careful location of some point half-way between *A* and *X*, you can use that middle point and *X* to locate a point beyond *X*. Then fill in the poles between in the same manner as between *A* and *X*.

How to Find Talking Trouble.

I have a line running 7 or 8 miles east of town. The first telephone is two miles out, the second nearly four miles, while five miles out there is a branch with three on it; ten telephones in all. Now, all ring in well and can be rung well, but none but the first two can talk through central so as to be heard. The eight all talk loud to one another on the line, but can hardly hear or be heard through the board, not even by the operator. The line is No. 14 iron to within 100 feet of the office, where it enters cable of paper insulation, 50 pair, with pothead terminal. The line is like all others, grounded or single wire style. I have gone over every tie in the wire from board to No. 3, but still find the same trouble in talking, while all ring and receive rings O. K.

It may be that the battery in these eight telephones has partly run down, not enough to prevent local talking, but enough to interfere with talking through the board. Examine the line jack of that line. See if it is clean. To clinch it, make a test as follows: Ring up the telephone farthest out, and have the operator try to talk and hear. It will be very poor. Take a good telephone with new dry cells, drive out to where the three branch off. Tap the line and connect the test telephone from line to ground. Ring up your farthest man and test. If the talk is loud and clear, fully up to standard, move to a point nearer town and try again. Go slowly, and be sure that others are not bothering you by listening on the line while testing. Follow the line in this way clear into the office and if you do it right you will catch the trouble. There should be a marked falling off in loudness when you get past the bad place in the line, if there is one.

Telephone News

INDEPENDENT TELEPHONE CONVENTIONS

Southern Independent Telephone Association, Montezuma, Ga., July 14.

P. C. Holdoegel Becomes President of Iowa Independent Telephone Association.

It has been made public by the Iowa Independent Telephone Association that some days ago Mr. James H. Shoemaker, general manager of the Corn Belt Telephone Company, tendered his resignation of the office of President of the Association, to be effective as early as a meeting of the executive committee could be arranged. This resignation was accepted at a meeting of the executive committee held June 29, and Mr. P. C. Holdoegel was elected to fill the vacancy.

The Association has sent out a notice to the members informing them of these conditions, and also stating that, while the Corn Belt, Cedar Rapids & Marion, Johnson County, Vinton & Benton Telephone Companies have been sold, they have the assurance that there will be no change in the policy of these companies, and the present connecting relations will remain the same.

It was intimated in some quarters that the sale of Mr. Averill's holdings would tend to retard the Independent development of Marshalltown. As a matter of fact, however, Mr. Hawley, of the Hawley-Cheadle Construction Company, which is going to build the new Independent exchange at Marshalltown, considers the opportunities as good as ever, and will push the undertaking rapidly forward to success.

Reorganization of Independent Companies of Detroit.

At a meeting of the directors of the Home Telephone Company, of Detroit, held on July 1st, Mr. W. A. Jackson, formerly president and chairman of the Executive Committee of the Michigan State Telephone Company, and Mr. H. H. Robinson, formerly general superintendent of the Michigan State Telephone Company, were placed in charge of the Detroit Home Telephone Company and the Interstate Long Distance Telephone Company, as operating officials, pending the incorporation and re-organization of both companies, which will be accomplished about July 20th. At that time Mr. Jackson will be elected president of the Home Telephone Company, of Michigan, and Mr. Robinson will be elected general manager.

The re-organized company will cover most thoroughly all of the territory heretofore operated by the two separate organizations, and will become much more thoroughly localized. While some of the present St. Louis directors will remain on the board, considerable new Detroit capital has been interested, and a number of prominent local business men will take their places on the new board.

The Detroit Exchange of the Home Telephone Company is now serving approximately 11,000 telephones, and it is anticipated the list will be rapidly extended.

The property of the company is one of the finest in the world, and the service is rapid and efficient.

Program for the North Dakota Convention.

Arrangements have been completed for the third annual convention of the North Dakota Independent Telephone Association, to be held in Devils Lake, July 9 and 10. Without a doubt this year's meeting will be the biggest gathering of the kind yet held in the State and no trouble will be spared to make it a success, both by the Executive Board and the people of Devils Lake.

The Independent Telephone Association now numbers among its members over 125 owners of Independent lines through the State, controlling all told over 50,000 miles of wire and hundreds of exchanges. The magnitude of the interests to be represented at the meeting is hardly realized by the people of the State or the many benefits which they are to derive from the improved service resulting from the discussions at the annual conventions. Many important and far reaching reforms have been instituted mainly through the influence of the meetings of the past two years.

Following is the program for the convention:

9:30 A. M.—Music.

10 A. M.—Convention called to order. Address of welcome, Mayor Whitman. Response, President L. A. Jacobson. Report of secretary and treasurer, John Carmody. Appointment of committees. Talks by exhibitors, salesmen and manufacturers. Adjournment for visiting exhibits.

AFTERNOON SESSION.

2:30 P. M.—Music.

3:00 P. M.—Convention called to order. "Standardization." L. D. Richardson, Fargo, general manager North Dakota Independent Telephone Company. Discussion. Paper. C. H. Tolan. Paper, C. H. Coar, Minot, general manager Northern Telephone Company. Discussion. "Legislation," Hon. John Carmody, Hillsboro. Discussion. Business session. Adjournment.

7:00 P. M.—Trip to Chautauqua grounds.

Lecture—John Lind.

Racine Merchants Want Competitive Telephone Service.

Last week the Retail Merchants' Association of Racine, Wis., met to discuss a proposed sale of the Citizens Telephone Company to the Wisconsin Telephone Company (Bell), which would eliminate competition. Mr. J. B. Ware, of the International Independent Telephone Association, was called upon to express his opinions and gave a general review of the development of the telephone business. Mr. Ware also presented an analysis of local conditions showing that there was a very small percentage of duplicate service, and that a merger would mean a higher price for practically all telephone users.

At the conclusion of the meeting the members of the Association pased a resolution of protest against the transfer of the Citizens company to its competitor, and urged the stockholders not to permit the Bell company to secure a monopoly of the telephone business in Racine. The passing of this resolution was received with applause by the audience.

West Virginia Western Part of National System.

Announcement has been made at Parkersburg, W. Va., that the West Virginia Western Telephone Company, operating 6,000 telephones and many exchanges in nine West Virginia counties and two counties in Ohio, has become a part of the system of the National Telephone Corporation. This, with other consolidations now under way, gives the National company control of Independent plants extending from Pittsburg south of Parkersburg.

Index for Volume 17 of Telephony.

Indexes of the leading articles and items of practical interest in Volume 17 of TELEPHONY, including issues from January 2, 1909, to June 26 inclusive, are now ready for distribution. These indexes form valuable reference lists for those who have kept their copies of the Journal, and will be forwarded to subscribers upon receipt of their requests.

Virgil A. Geiger Dead.

Virgil A. Geiger, owner and editor of the Truth, a very popular newspaper of Churubusco, Indiana, is dead. The death of Virgil A. Geiger does not only end a very useful and busy life, but also a career unique and progressive. When Mr. Geiger began the publication of the Churubusco Truth, a local paper in a small town, he realized the difficulty and time required to gather the news and happenings of his territory. Thereupon he installed a telephone exchange in connection with his paper and constructed lines in many directions which proved to be a great success. He procured a large number of subscribers to his telephone service and gathered nearly all his matter over the telephone wires, making his paper the most interesting and prosperous local publication in the county. Mr. Geiger was also a staunch believer in the practicability of a postal telephone service for short and important messages, and at one time elicited the interest of Vice-President Fairbanks in his advocacy of such service. The plan as proposed by Mr. Geiger was to address postal cards or sealed letters to a person at a particular postoffice, with a direction to the postmaster to immediately call up the party addressed and read the contents to him over the telephone. He claimed that thousands of telephone patrons live from two to fifteen miles from a postoffice, receiving but one mail a day, but could be advised, within a few moments after opening of a mail, of the contents of important messages—a service almost as speedy as the telegraph.

Carrying Out Promises at Indianapolis.

The Indianapolis Telephone Company is keeping its promises made as an inducement to the granting of the amended franchise. Improvements calling for an expenditure of $500,00 are well under way. Already many miles of additional cable have been installed, a large portion of which is under ground. The entire north district has been rebuilt and the northwest district, including North Indianapolis has also been rebuilt, doubling the capacity in that territory. This work alone required setting several miles of pole line, laying thousands of feet of underground conduit, and installing ten miles of lead-covered cable of fifty to 300 pairs each. The company has also purchased additional sections of switchboard for the north exchange which will increase the capacity in the Fall Creek territory at least 1,500 subscribers. Similar improvements have been completed in the Irvington district and the work of erecting a new branch exchange building on Bebelle avenue is progressing rapidly. When completed and installed the facilities in the eastern part of the city will be almost doubled. With these improvements and extensions the company is expecting to give service to a total of 18,000 to 20,000 subscribers.

Quick Toll Line Repairs.

A record in making toll line repairs was recently made at Oklahoma City by Mr. C. A. Harleman, toll line troubleman. Early in the morning of May 6 the Oklahoma City wire chief found the lines south out of order. The next train going south was at 11:55 a. m. and it would take at least two hours and a half to drive with team and buggy. After carefully considering the importance of the circuits which were out of service, the wire chief decided to hire an automobile to send out to make the repairs. By 7 a. m. he had not succeeded when Mr. Harleman came on duty. He then told Harleman to go and hunt for one, which he did. At 7:55 a. m. Harleman was ready to start for the trouble which showed up (on the instruments) about 17 miles south. Harleman found 24 poles down 16 miles south. He then went on to Norman and got two men to help him, leaving the other man to report particulars of the break to the wire chief, and give a list of material necessary for permanent repairs. Two circuits were working through at noon, and all circuits were O. K. at 1:30 p. m.

The trip from Oklahoma City to the break, 16 miles, was made in forty-nine minutes. The auto cost was $9, and the entire cost of the trip $18.11, exclusive of the regular lineman's salary.—*Monthly Bulletin, Pioneer Tel. & Tel. Co.*

Albany Home Company Starts Base Ball Service.

The Home Telephone Company, of Albany, N. Y., has recently introduced into its service a new feature: information about baseball. This service begins daily, except Sundays, at 3:30 p. m., and continues until 8:30 p. m. A large number of calls are answered between the hours of five and seven o'clock, when the "fans" are particularly impatient. Four telephones, a scoreboard and connections with the local newspaper and telegraph offices comprise the equipment of the service, which is steadily increasing in popularity.

The La Crosse Telephone Company's New Directory Furnishes a Good Advertisement.

A recent number of the *Leader Press*, of La Crosse, Wis., gives a photograph of a large wagon load of directories as they are being carried out for distribution among the subscribers of the La Crosse Telephone Company. The method of distributing them used is to send them by messenger boys from the telegraph office, to which place they were being carried when photographed. As the books for about 3,000 subscribers were in the wagon at one time, and made a good sized load, the photograph showed the people in an interesting way the size to which the Independent telephone company's business has grown.

Necessity of Holding Ample Reserves.

In a talk on the bad results of using too large a proportion of the earnings for extensions of plant, Mr. W. J. Uhl said, at the Indiana convention:

"Perhaps the most striking argument which could be advanced in favor of selling stock for extensions is the fact that on February 14 and 15, the worst sleet storm in the history of that section visited north central Indiana, the center of the storm and the heaviest loss being in the eight counties comprising the third district of your association. More than 2,000 poles were broken down, and hundreds of miles of line wire were torn down and rendered unfit for re-installation. Service was demoralized for weeks.

"This territory represents 18,385 Independent telephones and 1,510 circuit miles of Independent toll lines, and the total loss to the property is estimated at not far from $69,000. Most all of these companies in the past have endeavored to add to their property out of the earnings, and did not provide a cash reserve for reconstruction, and must now pass their dividends until after the damaged property is replaced."

Fooling the Farmers.

A statement whose source will be readily recognized from the characteristic untruthfulness of its wording is the following, which recently appeared in Pacific Coast papers:

"The American Telephone and Telegraph Company, known as the 'Bell company,' controls 51 per cent of the stock of the Pacific company. The parent organization, until last year, held so tightly to its patent rights that it was only with the greatest difficulty that small Independent concerns could operate in the western field. Now, however, the way has been opened by which these small companies may purchase the needed instruments."

The people who are fooled by such statements when they first enter the telephone business eventually learn that in-

struments of the highest quality have been obtainable in the open market for years, and in the future apply proper discounts to statements coming from the same origin which they assign to the item quoted above.

State Board of Control Holds Meeting by Telephone in Washington.

Reports from Olympia, Wash., state an interesting use of the long-distance telephone made by members of the State Board of Control. Conditions arose which demanded a prompt meeting while one member was in Olympia, another in Chehalis and a third at Walla Walla. The three members were connected by long-distance telephone, and, in a ten-minute conversation, satisfactorily disposed of their business.

Discussion of Physical Connection.

Mr. W. C. Nein, a student at the University of Illinois, presented as a requirement for his degree, on graduation, an interesting thesis on physical connection of rival telephone companies, with compulsory interchange of service.

In taking up this subject, he has given a general comparison of Bell and Independent systems, using the recent census statistics to show that the Independents contributed a total increase of 183.4 per cent, while their rival has only grown 137.8 per cent from 1902 to 1907. Reference is made to the continuation of this rapid growth, as shown by the large number of incorporations of new companies and the high development of Independent systems for farmers' line service. The conditions of service under monopoly and under competition are contrasted, and conclusions unfavorable to monopoly are drawn.

Several points in favor of physical connection are cited, but these are of minor character. The contrary side of the proposition is covered in general by the statement that telephone men who have been called upon to express their views on the subject have been unanimous in agreement, "that it would retard development, destroy the benefits of competition and be tantamount to confiscation of property."

The thesis further states "that the chain is no stronger than its weakest link, so that this compulsory connection, it seems to me, is weak in two particulars; first, there could be no arrangement between the operating companies of such a character as to be mutually satisfactory to each company. It is unnatural to expect that any company would give its best service to its competitor and injure its good name. Even now companies get credit for poor sense for connecting with small companies. It would result in poor service; one company would seek to injure the other by saying that trouble was occasioned by their defective apparatus. Second: It would retard the development of the telephone business. No Independent operator or Bell either, for that matter, would put money into a town in the building up of a telephone business in which there was already an operating company if it thought compulsory connection would obtain, and that its competitor would have the advantage of its expensive development, for it would amount to practically no more than confiscation of its property."

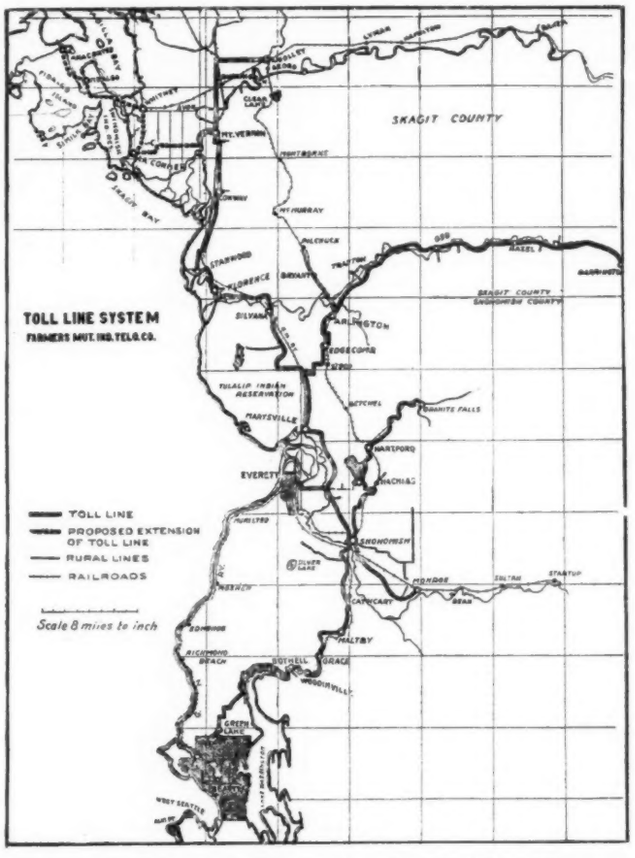
It is reasoned that interchange of service would eventually destroy competition, and that the benefits of competition are distinguished not only by the improvement of service, but by the diminution of rates as shown by a table of rates specifying charges just previous to the beginning of competition, and under competition at the present time, in many typical cities.

Mr. Nein quotes several state laws relating to physical connection and criticises, unfavorably, the proposition that a state law could make such a proposition workable, citing as an example of the dangers the condition arising in Wisconsin from the action of the secretary of the Railway Commission in promoting a monopolistic combination at Madison.

The thesis as a whole presents a very interesting view of the subject, including much valuable information in a small space, and the conclusions drawn by the writer will probably meet with the general approval of telephone men.

The Farmers' Mutual Telephone Company, of Washington.

A western Independent telephone company which has been making steady progress for some years past, and now has a large and prosperous system, is the Farmers' Mutual Independent Telephone Company, with headquarters at Everett, Wash. The company now operates exchanges in Anacortes, Arlington, Aquarium, Belleville, Bellingham, Burlington, Bayview, Bothell, Burton, Cedarhome, Conway, Cicero, Cathcart, Everett, Fir, Florence, Granite Falls, Hartford Junction, Kenmore, La Conner, Lisabuela, Lowell, Mount Vernon, Milltown, Marysville, Monroe, Maltby,



System of the Farmers' Mutual Independent Telephone Company.

Machias, Norman, Oso, Port Susan, Port Townsend, Portage, Sedro Woolley, Snohomish, Silvana, Stanwood, Stimson, Trafton, Vashon, Woodinville.

During the past year the company has been steadily at work completing construction projects which have been pushed vigorously for about five years past. The most recent work has been installing a new selective service system in Anacortes, and extending the plant at Everett. During the next few months the company will devote considerable attention to improvements of operating methods in various parts of its territory.

Toll lines connect the different exchange systems within the company's territory, furnishing an outlet to Seattle, where connection is made with the Independent Telephone Company's system.

The officers of the company are: President, Charles S. Wiley, Seattle, Wash.; general manager, J. M. Winslow, Everett, Wash.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

NEW COMPANIES.

NAPA, CALIF.—About 45 residents living in the vicinity of this place have organized the Imrieville Farmers' Telephone Company and the following officers were elected: William G. Furber, president; F. W. Zettle, vice-president and treasurer; E. H. McMillan, secretary; E. S. Swan and William McKenzie. The new company has been granted a franchise by the supervisors and will at once build its line from this city.

JENKINSBURG, GA.—B. F. Aiken, J. F. Tingle and others have entered application for a charter for the Jenkinsburg Telephone Company for a period of 20 years, to construct and maintain local and long distance telephone lines.

ALDRIDGE, ILL.—The Preston Union Telephone Company has been incorporated with a capital stock of $2,500. Dr. C. D. Gardner, of Grand Tower, is one of those interested in the company.

EUREKA, ILL.—Articles of incorporation have been filed by C. J. Gibson, D. H. Schertz and A. L. Wood for the Eureka Farmers' Telephone Company. The company is capitalized at $5,000.

WORDEN, ILL.—The Worden Telephone Company has been incorporated with a capital of $2,500. The incorporators are John C. Mueller, Charles W. Piper, F. W. Stocker.

PATOKA, IND.—Articles of incorporation have been filed with the Secretary of State by the Patoka Telephone Company. The object is to construct and operate a telephone system in Crawford and adjoining counties. Jacob Partenhenew, John T. Zimmerman, John Deitch, Thos. Smith and Ross Hamilton are the directors.

EAST PLEASANT PLAIN, IA. (Jefferson Co.)—The Pleasant Plain Telephone Company has been incorporated with a capital stock of $15,000. The incorporators are O. C. Spaulding, J. J. Kyle, Mahlon Roberts, John Diers, F. L. Eck, Calvin Hoskins, A. J. Johnson, L. J. Gorusch, Frank Drish, Frank Packa, E. L. Jones and Ed. McCrunley.

LILAC, KY.—The Leitchfield and Franks Mill Telephone Company has been incorporated by Tramel Carter, J. W. Watson, J. C. Ramsey and J. C. Wilson, with a capital stock of $500.

READOUT, OKLA.—The Stockholm and Southwestern Telephone Company has been incorporated, capitalized at $2,000. Incorporators are J. W. Williams, H. W. Allen, H. P. Amo, G. L. Nesbitt and J. A. Anderson, of Readout, and A. Gardner, of Cupid.

TALALA, OKLA.—The Talala Telephone Company has been organized, capitalized at $5,000. The incorporators are A. W. Campbell, J. L. Beatty, A. J. Rider, C. Graves, R. L. Farrar and A. O. Fisk, all of Talala.

VINITA, OKLA.—The Craig County Telephone Company, with principal offices at this place, has been incorporated with a capital stock of $3,000. Mathew Fields and E. E. Leforce, of Estella,

GASTON, ORE.—The Hill Mutual Telephone Compan y has been organized with a capital stock of $500 to operate a telephone system. R. W. Airey, I. S. Ramsey, Charles Holt, C. J. Torstens, David Cruickshank, C. A. Wyman, J. Kopplin, O. G. Cornahan and I. M. Hill are the incorporators.

INDEPENDENCE, PA.—Independence Farmers' Mutual Telephone Company is the name of a new company organized here. The following are the officers: President, Dr. R. A. Stewart; vice-president, George W. Buxton; secretary, C. P. Buchanan; treasurer, Harry G. Huffman; directors, Clyde H. Perrin, James W. Murdock and U. U. Thompson.

STANTON, TENN.—Local business men have organized a telephone company to construct and operate a system in this place. The company is capitalized at $2,000 and the officers are: W. B. Douglas, president; W. S. McMahon, vice-president; F. G. Rawlins, secretary-treasurer, and P. O. Wilkerson, business manager. The directors are, W. B. Douglas, W. S. McMahon, F. G. Rawlings, P. O. Wilkerson, J. B. Kerr and J. A. Jones.

WACO, TEX.—The Texas Central T lephone Company has been incorporated and is capitalized at $6,000. M. H. Lane, Charles G. Davidson, William D. McLear and T. Landrum are the incorporators.

LARSEN, WIS.—The Larsen Telephone Company has been organized, capitalized at $10,000. The incorporators are Niels Jensen, A. H. Hindman and Louis Sorenson.

POPLAR, WIS.—A meeting was recently held at this place for the purpose of organizing a farmers' telephone company. The meeting was well attended and the organization was effected, A. D. Brown being elected president; H. J. Dixon, vice-president; Fred Sandin, treasurer, and A. Lelione, secretary. Work of construction will be commenced immediately, the line running to the north of this place extending to Berg Park and Wentworth.

FORDWICH, ONT., CAN.—The Springbank Telephone Company has been incorporated with a capital stock of $10,000. The directors are J. McLaughlin, R. Ferguson and J. Padfield, and the principal office will be in this place.

TOLEDO, ONT., CAN.—The Rural Telephone Company, of Kitley, with head offices at Toledo, has been incorporated with a capital stock of $10,000. A. R. Hanton, J. M. Edgar and R. T. Beckett are the provisional directors.

FINANCIAL.

PITTSFIELD, ILL.—The stockholders and directors of the Pike County Telephone Company met recently and re-elected the old officers and directors. At this meeting a 3 per cent dividend was declared.

COBDEN, MINN.—The directors of the Cobden Mutual Telephone Company at the recent meeting declared a 6 per cent dividend. The business of the past year showed an increase of about 14 per cent.

OMAHA, NEB.—A company known as the Nebraska Securities Company has been incorporated, the capital stock placed at $750,000. The directors of this company are Walter Grover, George E. Shoemaker, F. M. Phipps, Charles P. Flynn and Albert Wilson, the latter acting for Joseph Harris. It is said by F. E. Ebersole, president of the Independent Telephone Company of Omaha, that the company is incorporated for the purpose of taking over the telephone company's indebtedness. The Nebraska Securities Company will expend about $400,000 in extending the company's system. Construction of a system at Florence will be resumed and an exchange will be built at South Omaha. President F. E. Ebersole will remain in charge of the company's business.

LACONIA, N. H.—The directors and stockholders of the Citizens Telephone Company, at a recent meeting declared a semi-annual dividend of 3 per cent.

CRANDON, WIS.—The Crandon Telephone Company has amended its charter, increasing the capital stock from $3,000 to $7,500.

FRANCHISES.

WINDSOR, MO.—A 20-year franchise has been granted the Missouri Union Telephone Company to operate a telephone system. The franchise is practically the same as the one under which the company is now operating.

MANDAN, N. D.—The Southern Morton County Telephone Company has been granted a franchise to construct and maintain a telephone system in this county.

CONSTRUCTION.

TERRE HAUTE, IND.—The New Long Distance Telephone Company, with headquarters in Indianapolis, is planning to give this place greater toll facilities with eastern points. Additional toll circuits are being constructed to take care of the steadily increasing business.

CLINTON, IA.—The automatic telephone system installed in this city by the Tri-City Telephone Company is now entirely completed.

AMERICUS, KAN.—The Americus Telephone Company has made arrangements to build an additional circuit between this place and Emporia. This will be gladly welcomed by the telephone users as it will tend to make the service much better.

KAHOKA, MO.—The Kahoka Telephone and Construction Company will replace its open wire lines with cable this summer.

PALMYRA, MO.—The Palmyra Telephone Company has just completed the construction of a direct line from Hannibal to St. Louis.

OLD FORGE, N. Y.—The Fulton Chain Telephone & Telegraph Company has purchased the material for the construction of a new copper line from this place to Beaver River, via Eagle Bay and Big Moose.

MOORESVILLE, N. C.—The Mooresville Telephone Company, under the management of Mr. J. A. Harrill, who has served the company in that capacity for the past year, is very prosperous. New toll lines have been built and all the old toll lines are being rebuilt. In the city, all open wires will be taken down and in the business center will be placed underground, while those running through the residential district will be placed in overhead cable. A new switchboard was also installed recently.

STATESVILLE, N. C.—The directors of the Iredell Telephone Company have completed arrangements for the building of a new exchange building in this place.

INDEPENDENCE, PA.—The Union Construction Company, which recently purchased the lines of the Chartiers Telephone Company, is pushing to completion the work of rebuilding the

system. A new line has been built from Avella and Pattersons Mills. Other lines are under construction.

ROCK, PA.—The Pinegrove and Schuylkill Haven Rural Telephone Company is building a branch line from De Turksville to Summitt Station, through this city.

WEST MIDDLETON, PA.—The National Telephone Company is erecting new telephone lines at this place and a new switchboard will be installed.

RICE LAKE, WIS.—The Rice Lake and North Eastern Telephone Company is now building a metallic toll line from this place to Sarona via Brill, Nobleton and Rockford, and contemplates constructing several rural lines in Oak Grove and Long Lake.

WAUSAU, WIS.—The Marathon-Ziegler Telephone Company contemplates extending its line from Little Chicago to Athens.

PINEDALE, WYO.—It is reported that a new Independent telephone line is to be built in the Valley connecting all the ranches as well as the towns of Encampment, Saratoga, Walcott, Ft. Steele, Rawlins, Hanna, Medicine Bow, Rock River, Dosler and Laramie.

HANLEY, SASK., CAN.—The Saskatchewan government has notified the village authorities of its intention to build a local telephone system, and work will be commenced almost immediately. A long distance exchange has already been opened in this city by the government.

HANLEY, SASK., CAN.—The Hanley Rural Telephone Company, recently organized, has decided to build about 40 miles of line this year. D. M. Dilley has been appointed manager of the company.

ELECTIONS.

KEWANEE, ILL.—Officers for the Kewanee Home Telephone Company were elected recently to serve the company for a year, and are as follows: President, W. I. Hibbs, Pittston, Pa.; vice-president, A. Ellithorpe, Pittston, Pa.; secretary and treasurer, A. C. Shoemaker, Pittston, Pa. The directors, who were all re-elected, are: W. I. Hibbs, S. A. Ellithorpe, A. C. Shoemaker, J. N. Anderson, John A. Law, William H. McMillan, S. M. Parke and G. B. Thompson. All are from Pittston, Pa. The reports of the officers showed the company to be in excellent condition, many extensions having been made to the toll and local lines.

CORYDON, IND.—Stockholders of the Eureka Telephone Company met recently and as a result of the election held the following officers and directors were chosen: President, Lonnie Cunningham; vice-president, Eli Shields; secretary, H. P. Beanblossom; treasurer, D. C. Davis; directors, J. W. Dellinger, Dan Cunningham, Henry Struble, David Shaffer and Jacob Schneider. The company is in excellent condition in every way and is steadily growing.

BANGOR, IA.—At a recent meeting of the Bangor Telephone Company directors, the following officers were elected: H. M. Green, president; C. C. Carson, secretary, and C. R. Whitney, treasurer.

ELDORA, IA.—At the annual meeting of the Eldora Mutual Telephone Company officers were elected as follows: President, N. R. Van Avery; treasurer, W. E. Rathbone; secretary, H. Hall. The president, vice-president, treasurer and Dr. G. E. Diehl, C. A. Beaver, N. S. Carpenter and C. F. Stauffer constitute the board of directors.

GRINNELL, IA.—The Sheridan Telephone Company recently elected as officers and directors Frank Shadel, president; F. R. Graham, secretary; R. Spire, treasurer, and S. W. Reams and Ed. Schaffer as directors.

COLBY, KAN.—The Thomas County Farmers' Mutual Telephone Company met recently and John Stover was elected president; J. S. Keller, secretary, and Charles Heath, treasurer.

COBDEN, MINN.—At the meeting of the stockholders of the Cobden Mutual Telephone Company, held recently, Axel Newdall was elected president; Chas. Neid, vice-president; J. M. Steinke, secretary, and R. M. West, treasurer. Fredericksen and T. Peterson were elected to the board of directors.

BUTTE, MONT.—At a recent meeting of the stockholders of the Independent Telephone Company directors were elected as follows: H. A. Gallwey, T. S. Lane, C. J. Kelly, C. F. Kelley, M. S. Largey, J. T. O'Brien, L. O. Evans, W D. Conrad, Patrick Wall, J. J. Flannigan, F. H. Clinton, H. B. Brown and W H. Hall.

WEST POINT, NEB.—B. H. Von Seggern was elected president of the Cuming County Telephone Company; Peter Witt, vice-president; J. E. Albers, secretary, and George Lehmkuhl, treasurer, at the annual meeting of stockholders. The directors are G. H. Albers, T. C. Fleming, and B. H. Von Seggern.

GREENE, N. Y.—W. Winston, George West, Wm. B. Webb, M. H. Drake, Geo. W. Webb, A. M. West and Eugene Watrous were recently elected as directors of the Chenango-Broome Telephone Company by the stockholders. The directors chose as officers: President, A. M. West; vice-president, E. Watrous; secretary and treasurer, Geo. W. Webb.

McARTHUR, OHIO—At a meeting of the stockholders of the McArthur Telephone Company, held recently, H. S. Hamilton was elected president; L. A. Edwards, secretary; A. W. Paffenbarger, treasurer and manager, and to the board of directors were chosen H. S. Hamilton, A. W. Paffenbarger, Dennis Steele, L. W. Thorpe and L. A. Edwards.

DANVILLE, PA.—The People's Ideal Telephone Company held its annual meeting a short time ago and the election resulted in L. W. Welliver being elected president; John Eves, vice-president; D. A. Cox, secretary, and Lloyd Bomboy, treasurer. The following board of directors was chosen: Rev. J. W. Kohler, J. W. Lowrie, Charles Shires, John Eves, F. M. Opp, D. A. Fowler, F. S. Peeling, Harley Benfield and L. W. Welliver.

LANDISVILLE, PA.—The following officers and directors have been elected to serve the Landisville Telephone Company: President, J. M. Trout; vice-president, Ezra Miller; secretary-treasurer, P. W. Baker; assistant secretary, P. W. Baker. These with Jonas L. Minnich, Samuel N. Root, Jacob W. Kreider, Amos Hoffman, Howard B. Stauffer, Christian C. Greider, Frank H. Shenk and David R. Stauffer constitute the board of directors.

WAYNESBURG, PA.—At the annual meeting of the stockholders of the Greene County Telephone Company the following were elected directors: W. S. Scott, Eli G. Gailey, Thomas Hughes, Challen W. Waychoff, Roy J. Waychoff, J. N. Scott, J. F. Bailey, F. F. Bayard and Charles F. Randolph. The directors organized by electing J. N. Scott, president; Thomas Hughes, vice-president, and J. F. Bailey, secretary and treasurer.

MISCELLANEOUS.

ATLANTA, GA.—The Atlanta Telephone & Telegraph Company suffered serious damage to its system recently, when the main exchange in that city caught fire, possibly through the crossing of two wires with the insulation worn off. About 30 operators were busy at the board, when a flame of fire leaped out through one of the boards near the south end. The operators foresook their work but for a moment, duty to their charge calling them back to work. They continued putting up connections, meanwhile sending in calls for help. It is not known to just what extent the exchange was damaged, but all the telephones in the city were cut off from service, and the fire crept along the switchboards, damaging them to a great extent. As soon as the fire was extinguished, repairmen were set to work to undo the damage to the lines, and it was reported that service would be resumed within a comparatively short time.

CRAWFORDSVILLE, IND.—The Home Telephone Company has been reorganized and is now controlled solely by local citizens. During the past few months the majority of the stock was owned by outside capital, under the management of J. K. Johnston, of Columbus, Ohio. Officers of the reorganized company are: Theodore H. Ristime, president; D. M. Peek, vice-president; Chas. W. Hymer, secretary, and J. K. Johnston, treasurer. A new and modern exchange building is being erected and a new switchboard will be installed.

SLOAN, IA.—The Sloan Telephone Company which up to the present has been owned and operated by a stock company, has been sold to W. R. Barnard. Mr. Barnard contemplates completely overhauling the system.

WASHINGTON, LA.—The Washington Telephone Company has opened its exchange at this place. Mr. F. Emery Bell is local manager.

BUTTE, MONT.—In a report made to the stockholders of the Independent Telephone Company by T. S. Lane, managing director, it was shown that the company has nearly doubled its service in the past year, having in operation on June 1, 1908, 2,521 telephones and at the same time, 1909, 4,088. During the coming year many additions will be made to the system. An exchange will be installed at Missoula; long distance lines from Deer Lodge to Missoula and Wallace, Idaho, and from Missoula to Hamilton, with exchanges at Stevensville, Hamilton and other points in the Bitter Root valley. The construction of the automatic system in Helena is well under way and it is expected will be in operation about October 1.

COLUMBUS, OHIO.—Miss Miller, the operator at the suburb of Grove City, saved the village from a serious fire recently. Miss Miller had retired after having been relieved from duty and being awakened by the barking of a dog noticed that a large business block across the street was on fire. She aroused the people by means of the telephone and by her timely action the loss was kept to a minimum by the volunteer fire department.

BRIDGEPORT, ORE.—John Thompson is interested in the project for the construction of a telephone line from this place to Unity.

SALT LAKE CITY, UTAH.—The Commissioners are considering a plan to place a telephone exchange in the City and County Building, on the county's side.

UNDERGROUND.

LORAIN, OHIO—The Black River Telephone Company has requested the Board of Public Service for permission to lay certain portions of its system underground. This request will be granted.

VICTORIA, B. C., CAN.—The British Columbia Telephone Company has decided to place all its wires in this city underground. The city will finance the work and will stand one-tenth the total cost. The company will pay interest and a sinking fund. Alderman Mable is one of the interested parties.

PORTAGE LA PRAIRIE, MAN., CAN.—Recently the Manitoba Telephone Commission of Winnipeg, Man., called for tenders for the construction of a new telephone exchange in Portage La Prairie, and for new equipment.

ALAMEDA, SASK., CAN.—J. P. Gordon, secretary-treasurer of the Alameda Rural Telephone Company, recently called for quotations for the construction of about 70 miles of pole line for the company.